A

DICTIONARY

OF

THE ECONOMIC PRODUCTS OF INDIA.

BY

GEORGE WATT, C.I.E., M.B., C.M., F.L.S.,
REPORTER ON ECONOMIC PRODUCTS TO THE GOVERNMENT OF INDIA.

(ASSISTED BY NUMEROUS CONTRIBUTORS.)

IN SIX VOLUMES.

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The trade statistics have been furnished by Mr. J. E. O'Conor, Assistant Secretary, Department of Finance and Commerce, Government of India. In supplying these figures Mr. O'Conor has rendered me a most important service; at the same time he has obligingly offered many other suggestions and corrections.

Further, I would acknowledge the great personal interest taken in the work by Mr. E. J. Dean, Superintendent of Government Printing, India. Working with the staff of printers who have but an imperfect knowledge of the English language, Mr. Dean has shown, as I believe will be readily admitted, that he can produce an elaborate work of this nature in a manner worthy of a high-class European press.

GEORGE WATT.

CALCUTTA,
January 1st, 1889.

LIST OF WORKS CONSULTED.

The following is a list of the more important works, journals, reports, or other publications which have been either directly or indirectly consulted in the preparation of the "Dictionary of the Economic Products of India." As far as possible, the rule has been followed of quoting original authors, and an effort has been made to show the source from which every statement has been derived. It is hoped that this fact may be accepted as a decided advantage, but it has somewhat encumbered the work with references.

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PREFACE.

THE following are the circumstances which led to the publication of the Dictionary of Economic Products. In 1877, the Agricultural Department of the North-Western Provinces was required to provide a collection of products for the Paris Exhibition, and again, in 1880, for the Melbourne Exhibition. Early in 1883, the Imperial Department of Agriculture was called upon for a third collection for the Exhibition at Amsterdam. Requisitions were at the same time received from the Governments of Italy and Belgium for sample collections of commercial products. The collections above referred to were all made, under the direction of the undersigned, by Babu Trailokhya Nath Mukharji, now the Assistant Curator of the Economic Section of the Indian Museum, and their formation led to the gradual compilation of a list of the more important Economic Products of India, which was illustrated by a series of samples or specimens arranged in glass-fronted tin cases designated the "Index collection." But the list was far from being complete, and was necessarily wanting in scientific detail and arrangement. Matters stood thus when a request was made to the Imperial Government by the Government of Bengal for assistance and co-operation in providing a collection of Economic Products for the Calcutta Exhibition of 1883-84. The opportunity was taken to obtain from the Government of Bengal, for the purpose of securing the scientific arrangement of the collection, the services of Dr. George Watt, of the Bengal Educational Department, who had been originally sent out to India as Professor of Botany, and who had already done useful work in the field of

botanical research. The Bengal Government had, at the same time, formed the intention of bringing into scientific order a valuable collection of Bengal products at the Provincial Economic Museum in Calcutta.

Dr. Watt, with the assistance of Babu Trailokhya Nath Mukharji, devoted himself, during 1883, to the combined duty which he was called upon to perform, of enlarging and arranging both the Imperial and Provincial lists and collections. The results were exhibited in the Economic Court at the Calcutta Exhibition, and formed a great stride in advance of all that had been previously done. The time, however (less than a year), allowed for the preparation of the Calcutta collection was too short for a full compilation of the facts and statistics which were necessary for the proper investigation and description of each product. Nor was the index collection itself sufficiently full. These circumstances, as well as the likelihood of having to provide a collection for the London Exhibition of 1886, led to the retention of Dr. Watt's services by the Imperial Department for the purpose of preparing as complete a "Dictionary of Economic Products" as might be possible, with the information already existing in the Agricultural Office; Babu Trailokhya Nath Mukharji being at the same time entrusted with the duty of enlarging the "Index collection" of specimens.

It is needless to explain that the work upon which Dr. Watt has been thus engaged is one which it would have been in any case necessary for the Agricultural Department to carry out independently of any call which was made upon it in connection with Exhibitions. At the same time the utility of Exhibitions in forwarding the performance of the duty should not escape notice. Now that the work has reached the stage of a compilation of existing facts and statistics up to date, it will become the further duty of the Department to make, with the assistance of the Agricultural Departments of the Provinces, such investigations as may be necessary for obtaining the fuller information,

which is still wanting, about many of the Economic Products of the country, as well as to maintain and publish periodical statistics of the production of or the traffic in the more important articles. It will become a question for consideration whether a second and more complete edition of the present work should not be published by the Department when sufficient material has been collected, and the present opportunity is taken to invite all who may be interested in the matter to contribute any information which may serve to correct or supplement the contents of the first edition.

E. C. BUCK,

Secretary to the Government of India,
Department of Revenue and Agriculture.

January 1st, 1889.

PREFACE.

THE circumstances which led to the publication of the present work having been indicated by Sir Edward Buck, it may not be deemed out of place for me to offer a few words of explanation regarding the manner in which I have endeavoured to accomplish the task committed to me. The present edition professes to be an approximately complete *résumé* of the opinions of Indian authors, and of extensive official and private enquiries, regarding the Economic Products of India. Care has been taken to show the sources from which the more important facts have been obtained, and to give, in most cases, the entire list of works consulted in the preparation of the account of each product. I have chosen to adopt this course, even in dealing with facts so well known that they might legitimately have been published without acknowledgment. It is hoped that on this account the "Dictionary of the Economic Products of India" will be found a useful work of reference, and that it may form the nucleus of an extended and systematic enquiry into the productive resources of the Indian Empire. The limited time at my disposal has almost precluded original and personal investigation of critical questions, and therefore, except in so far as ten years of botanical research in India have supplied me with the means of rapidly correcting misunderstandings, the opinions of authors, even when apparently conflicting, have been placed side by side. One of the objects I have kept in view has been to remove the confusion and ambiguity due to wrong or antiquated botanical names being associated with economic products. If I have succeeded, an important step will have been taken in the right direction; and the Dictionary, though not a strictly scientific publication, will, I trust, be found sufficiently accurate in its scientific details for all practical and commercial purposes.

I have had to keep in view a twofold purpose; *viz.*, on the one hand, to supply scientific information which may be useful to the administrative officer; and on the other, to meet the requirements of the reader in search of definite information regarding Indian economics. It may perhaps convey a not inadequate idea of the scope of the Dictionary to say that with this double purpose in view it is hoped that something may have been done to advance the material interests of India, and to bring the trade and capital of the West into more direct contact with the resources of the Empire.

With regard to botany, Sir J. D. Hooker's *Flora of British India* has been taken as the standard of scientific names and synonyms, and the reference to that invaluable work will be found in the first line following the name of each species. The botanic diagnosis of the plants from Ranunculaceæ to Acanthaceæ has been entirely derived from the *Flora of British India*. For the plants which fall into the natural orders after Acanthaceæ, a larger number of authors have had to be consulted; the scientific names used in this portion have been derived chiefly from Bentham and Hooker's *Genera Plantarum*; DeCandolle's *Prodromus*; Roxburgh's *Flora of British India*; The Linnæan Society's publications; Brandis's *Forest Flora*; Kurz's *Forest Flora of British Burma*; Thwaites' *Enum. Ceylon Plants*; Dalzell and Gibson's *Bombay Flora*; Stewart's *Panjáb Plants*; and Mr. Gamble's recent and most useful *Manual of Indian Timbers*. Until the authors of the *Flora of British India*, who are associated with Sir J. D. Hooker, have completed their account of the plants of India, it will be next to impossible for Indian authors to obviate a repetition of some of the errors of the older botanical writers. This is chiefly due to the fact that the libraries and collections available in India are too poor to admit of much literary and critical botanical research; moreover, work of this nature was not contemplated in connection with the present edition of the Dictionary.

A list of the principal authors from whom economic facts have been compiled will be found on page xiii. The economic products which belong to the Animal and Mineral Kingdoms have been but very imperfectly touched upon. It is hoped that these products may, however, receive more attention in a future edition, and the reader is, for the present, referred to the publications of the Geological Survey for detailed information about the Ores and Minerals of India. The majority of the brief notices regarding minerals which are here published, have, at the request of the Revenue and Agricultural Department, been kindly supplied by the Superintendent of the Geological Survey.

It may be explained that, with the permission of the Government of India, some 300 copies of each of my "Catalogues of the Economic Products of India" (Calcutta International Exhibition) were issued to officers of all Departments throughout India for additions and corrections. Of these a considerable number have been duly returned, and the Dictionary, incorporating as it does the new economic facts which have come to light through this combined enquiry, may be viewed as an improved and enlarged edition of the Catalogues. I have endeavoured to give as much prominence as possible to the information thus obtained, and the notes supplied will accordingly be found under each article following the symbol § and bearing an abbreviation of the name and address of each contributor.

A full list of all contributors will be found on page xxiii; but I must here express the very great obligation I am under to them all, and severally, for the liberal and invaluable aid they have given me.

With regard to the spelling of vernacular names, it may be stated that it has been thought unwise to depart from the method adopted by the authors from whom this work has been chiefly compiled. To correct the names given to the same object in the numerous languages and dialects of India would of necessity require the co-operation of many persons acquainted with these languages. At the same time the economic plants known to local authorities under certain vernacular names would have to be botanically determined. As this could not be accomplished in the limited time at my disposal, an effort has been made to indicate the long vowels by a diacritic mark, and it is hoped this will enable the reader to pronounce the majority of the vernacular names correctly. In a future edition greater care will doubtless be observed and the vernacular names will be revised and confirmed.

It may be explained that the vernacular names are given with reference to their provincial distribution rather than with regard to the language to which they actually belong; thus BENG. may mean simply that the word is in use in Bengal but need not be Bengali.

The alphabetical arrangement of the Dictionary is based upon the scientific names of the animals, plants, and minerals. This has been accepted as at once the most convenient and satisfactory standard, since it secures uniformity. With regard to large commercial products obtained from more than one species, such as silk, the subject has been treated collectively, instead of being broken up into a number of sections under the scientific names of the insects which yield the various kinds of silk. This should cause no difficulty however, as the numerous cross references will serve to direct attention to the heading under which the detailed accounts are to be found.

On the margin a number for each product or object has been given. It is hoped that these numbers may not only prove useful for museum purposes, but that they may also afford a convenient clue for correspondence regarding the products. To avoid using an inconveniently large number of figures, the numbers for each letter of the alphabet will be found to commence anew. The index will contain all the European and Vernacular names. It will give the corresponding scientific name and will enumerate the known and described products, referring the reader to the marginal number for each; thus—Gum, A. 756, or Fibre, B. 399. It is hoped that in this way the index may even prove useful as an independent work upon the names given to the Economic Products; it will contain over 30,000 vernacular words.

I desire to acknowledge in this place the invaluable services of the following gentlemen: Sir J. D. Hooker, late Director, Royal Gardens, Kew, for kindly permitting me to consult him upon difficult botanical points; Professor W. T. Thiselton Dyer, Director, Kew, for many valuable additions and corrections; Dr. George King, Superintendent, Royal Botanic Gardens, Calcutta, for the liberty to utilise freely the resources of the Herbarium and Library attached to the Gardens; Mr. C. B. Clarke, Inspector of Schools, Calcutta, for identifying doubtful plants; and Mr. J. F. Duthie, Superintendent, Botanic Gardens, Saharanpur, for notes and suggestions; Dr. H. Trimen, Director of the Botanic Gardens, Ceylon, for many important additions, more particularly with reference to Ceylon Botany. I am also specially indebted to Mr. E. T. Atkinson, Accountant General, Bengal, for many valuable additions to the proof-sheets of this work, and for having placed at my disposal manuscripts containing many interesting notes and original observations. I am likewise greatly indebted to the officers in charge of the Provincial Agricultural Departments, both for much personal assistance and for the prompt manner in which they have uniformly responded to my solicitations for the aid of local specialists.

To Dr. Charles Rice of New York, Dr. W. Dymock of Bombay, and Dr. Moodeen Sheriff of Madras, my best thanks are due for kindly consenting to revise the proofs of the present edition with the view of correcting the vernacular names and of adding to the information. I may be pardoned for quoting a passage from a private letter from Dr. Moodeen Sheriff as showing the liberal way in which he has co-operated with me: "In revising the vernacular names I am not solely depending upon my '*Supplement to the Pharmacopœia of India*,' but am consulting many other works and making fresh enquiries. This together with my experience, which is much greater than before, will, I hope, enable me to accomplish satisfactorily the work entrusted to me." I deeply regret the death of Dr. U. C. Dutt, of Serampore, the able author of "*The Materia Medica of the Hindus*," which has deprived me, in the greater portion of the work, of the assistance which he was so eminently qualified to render. Dr. Dutt undertook to supply a series of notes regarding the plants enumerated in the Glossary to his Materia Medica, and to revise the Sanskrit names in the bulk of the work. The latter duty has been generously undertaken by Dr. Rice, and as the result I have received from New York many valuable additions and corrections which cannot fail to prove valuable to students of Oriental literature. These distinguished scholars are not, however, in any way responsible for the accuracy of the vernacular names throughout the work, since many additions have been made subsequent to their kind supervision.

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Robinson; Surgeon-Major Mark, Coorg.
Ross; Surgeon George Cumberland, Delhi.
Roy; Assistant Surgeon Devendro Nath, Campbell Medical School, Sealdah, Calcutta.
Roy; Surgeon-Major G. C., Birbhúm.
Russell, M.D.; Surgeon C. M., Sarun.
Russell; Surgeon-Major E. G., Superintendent, Asylums, Calcutta.

RUTHNUM MOODELIAR, Native Surgeon T., Chingleput, Madras.
SAISE, D.S.C., F.G S.; W., Manager, East Indian Railway Company's Collieries, Giridhi
SAKHÁRÁM ARJUN RÁVAT, L.M.; Assistant Surgeon, Bombay.
SANDERS; Surgeon-Major E., Chittagong, Bengal.
SANGKY, M.B.; Surgeon-Major E. H. R., Bombay.
SEN; Assistant Surgeon Bolly Chand, Campbell Medical School, Sealdah, Calcutta.
SHIRCORE; Brigade Surgeon S. M., Moorshedabad.
SHOME; Assistant Surgeon Doyal Chunder, Campbell Medical School, Sealdah, Calcutta.
SMEATON, C.S.; D. M., Director, Agricultural Department, North-Western Provinces and Oudh.
SMITH; Deputy Surgeon-General C., Hyderabad Subsidiary Force, Secunderabad.
STEVENSON; W. H., Missionary, Free Church of Scotland, Santal Mission, Pachumba, Giridhi, Chutia Nagpur.
STEWART; Surgeon-Major W. D., Cuttack.
SUKHIA, L M.S.; Assistant Surgeon Nádarshah Hormasji, Bombay.
TALBOT; W. A., Conservator of Forests, Yellapur, Kanara.
TEMPLE; Captain R. C., Cantonment Magistrate, Umballa.
THOMAS; Surgeon-Major J. Byers, Masulipatam, Kistna.
THOMAS; Surgeon W. F., Mangalore.
THOMPSON, M.D., C.I.E.; Surgeon-Major D. R., Madras.
THORNTON, B.A., M.B.; Brigade Surgeon J. H., Monghyr (at present with the Suakim Field Force).
TILLERY; Mr., Jeypore.
TOMES; Surgeon A., Midnapore.
TRIMEN; Dr. H., Director, Botanic Gardens, Ceylon.
UMMEGUDIEN; Native Doctor V., Mettapolliam, Madras.
WACE; Lieutenant-Colonel E. G., Commissioner of Settlements and Agriculture, Panjáb.
WARD; Surgeon G. J., Mhow.
WARD; Apothecary Thomas, Madanapalle, Cuddapah.
WARDEN; Surgeon C. J. H., Professor of Chemistry, Medical College, Calcutta.
WATSON; Brigade-Surgeon George Alder, Allahabad.
WOODROW; G. M., Lecturer, College of Science, Poona.
WESTCOTT; Surgeon S., Dinapore.
WILSON; Surgeon William, Bogra.
WILSON, C.S.; W., Director, Revenue Settlement and Agriculture, Madras.
ZORAB; Surgeon-Major John M., Balasore, Orissa.

LIST OF ABBREVIATIONS.

Authors' names are abbreviated and printed in italics after the name given by them to an animal or plant. This is necessary, since the same object may have come to receive more than one name, and may even have been referred to two distinct genera—a result either due to ignorance of what had already been published, or in consequence of a difference of opinion regarding the nature of the species. The ambiguity thus caused through the existence of more than one name for the same object, or through the application of the same name to two distinct objects, is mitigated by affixing the author's name in full, if this be composed of only one syllable, or (when of more than one syllable) some convenient abbreviation to represent the author's name. The abbreviation once adopted by one author is never assumed by a second author who may chance to bear the same, so that *Wall*, is accepted by all botanists in the world to stand for Dr. Wallich, one of the most distinguished of Indian botanists.

The multiplicity of synonyms for the same object is one of the most perplexing evils—and an unavoidable evil—which besets systematic science. The changing of names is not, however, the result of fancy, but is a necessary consequence of improved knowledge and extended acquaintance with the forms of life. The difficulty of synonymy experienced by Indian students is scarcely felt in Europe, where the names given to the animals and plants are thoroughly established. This explanation is offered because of the very general complaint against the changes which have, within the past few years, been made in the names given to Indian animals and plants. It should be recollected, that the natural history of an empire, like that of India, cannot be worked out in a century, and that any attempt to systematise the scattered publications which have appeared from time to time must result in the suppression of names which have come incorrectly into existence. The following list gives the principal abbreviations adopted for authors' names :—

Abbreviations of Names of Botanists and Botanical Authors.

Ach.	Acharius.
Adans.	Adanson.
Afz.	Afzelius.
Ag.	Agardh.
C. Ag.	C. A. Agardh.
J. Ag. / *Ag. f.*	J. G. Agardh, son
Ait.	Aiton.
Aitch.	Aitchison.
All.	Allioni.
Amm.	Amman.
Anders.	Andersson of Stockholm.
Anders.	Anderson.
Andr.	Andrews.
Andr. B. Repos.	The Botanists' Repository, by Henry Andrews.
Andrz.	Andrzejowski.
Ann. mus.	Annales du Museum d'Histoire Naturelle.
Aresch.	Areschoug.
Arn.	Arnott.
Arrh.	Arrhenius.
Asa Gray.	Asa Gray.
Asch.	Ascherson.
Asiat. Reser.	Asiatic Researches
Aubl.	Aublet.
B. Cab.	Botanical Cabinet.
B. Mag	Botanical Magazine.
B. Misc.	Botanical Miscellany.
B. Reg.	Botanical Register.
Bab.	Babington.
Bail.	Baillon.
Baker.	Baker.
Balb.	Balbis.
Balbis.	Balbis (John Baptist), a French Professor of Botany.
Baldw.	Baldwin.
Balf.	Balfour.
Banks. Herb.	Banksian Herbarium.

Barn =	Barnéoud.
Barr.	Barrelier.
Bart.	Benj. Smith Barton.
W. Bart.	W. P. C. Barton, nephew.
Bartl.	Bartling (Th. Fr.) Ord. Nat. Plantarum.
Bartr.	John Bartram.
Bartr. f.	Wm. Bartram.
Bauh.	Bauhin.
J. Bauh.	Bauhin (Johannes).
Beauv.	Palisot de Beauvois.
Bedd.	Beddome.
Benj.	Benjamin.
Benn.	J. J. Bennett.
A. Benn.	A. W. Bennett.
Benth. or Bth.	Bentham.
Berg.	Bergius.
Berk.	M. J. Berkeley.
Berkh.	Berkhey.
Berken.	Berkenhout.
Berland.	Berlandier.
Bernh.	Bernhardi, a German botanist.
Bert.	Bertero.
Bertol.	Bertoloni.
Bess.	Besser.
Bieb.	Marschall von Bieberstein.
Bigel.	Jacob Bigelow.
Bisch.	Bischoff.
Bivon.	Bivona (a Sicilian botanist).
Bl. or *Blume.*	Blume.
Bl. Bijdr.	Blume (C. L.), Bijdragen tot de flora von Nederlandsche Indië.
Bl. Cat.	Blume's Catalogue.
Bœhm.	Bœhmer.
Boerh.	Bœrhaave.
Boiss.	Boissier.
Boland.	Bolander.
Bong.	Bongard.
Booth.	Dr. Booth.
Bonpl.	Bonpland.
Bork.	Borkhausen.
Bosc.	Bosc, a French botanist, &c.
Borsz.	Borszcow.
Brack.	Wm. D. Brackenridge.
Brebis.	Brebisson.
Bref.	Brefeld.
Brew. & Wats.	W. H. Brewer and Sereno Watson.
Brid.	Bridel.
Brong.	Brongniart.
Brot.	Brotero.
Brouss. =	Broussonet.
Br. or *R. Br.*	Robert Brown.
Br. or *N.E. Br.*	N. E. Brown.
P. Br.	Patrick Browne.
Brunf.	Brunfels.
Ham.	Buchanan Hamilton.
Buch.	Dr. F. Hamilton (formerly Buchanan).
Buch. Herb.	Buchanan's Herbarium.
Buch. MSS.	Buchanan's Manuscripts.
Buckl.	Buckley.
Bull.	Bulliard.
Burch.	Burchell (Wm.), a South African traveller and botanist.
Burm.	Burman.
Burm. Afric.	Burmann's (Johannes) African Plants.
Burm. Zeyl.	Thesaurus Zeylanicus, by J. Burmann.
Burm. Ind.	Flora Indica, by N.L. Burmann.
Buxb.	Buxbaum.
Cam.	Camerarius.
Camb. / *Cambes.*	Cambessedes.
Campd.	Campdera.
Cand.	De Candolle, usually DC.
Casp.	Caspary.
Cass.	Cassini.
Catesb.	Catesby.
Cav.	Cavanilles.
Cerv.	Cervantes.
Cham.	Chamisso.
Chapm.	A. W. Chapman.
Chav.	Chavannes.
Chois.	Choisy.
Clarke or *C. B. C.*	C. B. Clarke.
Clayt.	Clayton.
Clus.	Clusius.
Colebr.	Colebrooke (H. T.), a well known English writer on Indian plants.
Collad.	Colladon.
Colm.	Colmeiro.
Comm.	Commelin.
Corn.	Cornuti.
Coss.	Cosson.
Cunn.	Cunningham, A. or J.
Curt.	Wm. Curtis.
M. A. Curt.	M. A. Curtis.
Cyril.	Cyrilli, an Italian botanist.
Dalech.	Dalechamps.
Dalib.	Dalibard.

Dalz. =	Dalzell.
Dalz. & Gibs.	Dalzell and Gibson.
Darl.	Darlington.
DC. / *DcC.*	A. P. DeCandolle.
A. DC.	Alphonse DeCandolle, son.
Cas. DC.	Casimir DeCandolle, grandson.
Decne.	Decaisne.
Deless.	Delessert.
Dennst.	Dennstedt.
Desc.	Descourtilz.
Desf.	Desfontaines.
Desj.	Desjardins.
Desmar.	Desmazières.
Desmoul.	Desmoulins.
Desv.	Desvaux.
Dicks.	Dickson, an English cryptogamic botanist.
Diesb.	Diesbach.
Dieter.	Dieterich.
Dietr.	Dietrich.
Dill.	Dillenius.
Dillw.	Dillwyn.
Dod.	Dodonæus (Dodœns).
Don.	D. Don.
D. Don.	Don (D.) Prodromus floræ Nepalensis.
G. Don.	Don (G.) in Miller's Dictionary.
Donn. Hort. Cantab.	Donn. Hortus Cantabrigiensis, 1796.
D'Orb.	D'Orbigny.
Dorst.	Dorstenius.
Dougl.	Douglas.
Drej.	Drejer.
Dryand.	Dryander.
Dub.	Dubois, a French botanist.
Dufr.	Dufresne.
Duham.	Duhamel du Monceau.
Dumort.	Dumortier.
Dun.	Dunal.
Eat.	Amos Eaton.
D. C. Eat.	D. C. Eaton, grandson.
Edgew.	Edgeworth.
Edw.	Edwards.
Ehren.	Ehrenberg.
Ehret.	Ehret (Geo. Dion).
Ehrh.	Ehrhart.
Eichl.	Eichler.
Eiseng.	Eisengrein.
Ell.	Elliott.
Endl.	Endlicher.
Engelm. =	Engelmann.

Engl.	Engler.
Eschs.	Eschscholtz.
Eschw.	Eschweiler.
Ettingsh.	Ettingshausen.
Falk.	Falkner.
Fendl.	Fendler.
Fenill.	Feniller, a Chilian botanist
Feuil.	Feuillée.
Fingerh.	Fingerhuth.
Fisch.	Fischer.
Fl Dan.	Flora Danica.
Forsk.	Forskål.
Forst.	Forster.
Fourn.	Fournier.
Fresen.	Fresenius.
Freyc.	Freycinet.
Frœl.	Frœlich.
Gærtn.	J. Gærtner.
Gærtn. f.	C. T. Gærtner.
Gamble.	J. S. Gamble.
Gardn.	Gardner.
Garid.	Garidel.
Gasp.	Gasparrini.
Gaud.	Gaudin.
Gaudich.	Gaudichaud.
Germ.	Germain.
Gesn.	Gesner.
Gilib.	Gilibert.
Ging.	Gingins de Lassaraz.
Gis.	Giseke.
Gled.	Gleditsch.
Gleich.	Gleichen.
Glox.	Gloxin.
Gmel.	J. G. Gmelin.
C. Gmel.	C. C. Gmelin of Baden.
S. Gmel.	S. G. Gmelin.
Godr.	Godron.
Gœpp.	Gœppert.
Good.	Goodenough.
Grah.	Graham (Dr. J.), Professor o Botany at Edinburgh.
Grah. Cat. B. pl.	*J.* Graham's (J.) Catalogue of Bombay plants.
Gren.	Grenier.
Grev.	Greville.
Griff.	Griffith (Dr. W.)
Griseb.	Grisebach.
Grœn.	Grœnland.
Gron. / *Gronov.*	Gronovius.
Guett.	Guettard.
Guib. =	Guibord.

Guillem.	Guillemin.
Guimp.	Guimpel.
Gunn.	Gunnerus.
Guss.	Gussone.
Habl.	Hablizl, a Russian botanist.
Hagenb.	Hagenbach.
Hall.	Haller.
Ham.	Hamilton.
Ham.	Hamilton (Dr. Francis), formerly Buchanan.
Hanb.	Hanbury.
Hanst.	Hanstein.
Hartm.	Hartmann.
Hartw.	Hartweg.
Harv.	Harvey.
Hass.	Hassall.
Hassk.	Hasskarl.
Hausm.	Hausmann.
Haw.	Haworth.
Hb. Madr.	Herbarium (Madras), by Drs. Klein, Heyne, and Rottler.
Hebens.	Hebenstreit.
Hedw.	Hedwig.
Hegelm.	Hegelmaier.
Hegetsch.	Hegetschweiler.
Heist.	Heister.
Heldr.	Heldreich.
Helw.	Helwing.
Hemsl.	Hemsley.
Henck.	Henckel.
Henfr.	Henfrey.
Hensl.	Henslow.
Herb.	Herbert.
Herm.	Hermann.
Hild.	Hildebrand.
Hochst.	Hochstetter.
Hoffm.	G. F. Hoffmann.
H Hoffm.	Hermann Hoffmann.
Hoffmanns.	Hoffmannsegg.
Hofm.	Hofmeister.
Hohen.	Hohenacker.
Holmsk.	Holmskiold.
Homb.	Hombron.
Hook.	Wm. J. Hooker.
Hook. f.	J. D. Hooker, son.
H. f. and T. T.	Hooker, f. and T. Thomson.
Hopk.	Hopkirk.
Hornem.	Hornemann.
Hornsch.	Hornschuch.
Horsf.	Horsfield.
Houst.	Houston.
Houtt.	Houttuyn.
Huds.	Hudson.
Hueb.	Huebener.
Humb.	Humboldt.
H. B. K.	Humboldt, Bonpland, and Kunth.
Jack.	Jack (Dr. William), a most distinguished botanist.
Jacq.	N. J. Jacquin.
Jacq. f.	J. F. Jacquin, son.
J. St. Hil.	Jaume St. Hilaire.
Jord.	Jordan.
Jungh.	Junghuhn.
Juss.	A. L. Jussieu.
Adr. Juss.	Adrien Jussieu, son.
Kæmp.	Kæmpfer.
Karst.	Karsten.
Kaulf.	Kaulfuss.
Kindb.	Kindberg.
King.	G. King.
Kirschl.	Kirschleger.
Kit.	Kitaibel.
Koch.	Koch, Professor at Erlang.
Kœlr.	Kœlreuter.
Koen.	Koenig (J. Gerard), a Danish botanist and pupil of Linnæus.
Korth.	Korthals.
Kostel.	Kosteletzky.
Kremp.	Krempelhuber.
Kromb.	Krombholz.
Kth.	Kunth, an eminent Prussian botanist.
Kuetz.	Kuetzing.
Kunze.	Kunze, a German Cryptogamic botanist.
Kurz.	S. Kurz.
L. or *Linn.*	Linnæus.
Labill.	La Billardière.
Læst.	Læstadius.
Lag.	Lagasca.
Lall.	Lallement.
Lam	Lamarck (Monnet de La Marck).
Lam. fl. Fr.	Lamarck (J. Be Monet de) Flore Francaise.
Lam. fl.	Lamarck (J. B. Monet de) Illustration des genres.
Lamb.	Lambert.
Lamour.	Lamouroux.
Langsd.	Langsdorf.
La Peyr.	La Peyrouse.
La Pyl.	La Pylaie.

Laws.	Lawson.
Laxm.	Laxmann, a writer on Siberian plants.
Ledeb.	Ledebour.
Lehm.	Lehmann.
Lem.	Lemaire.
Lesch.	Leschenault de la Tour.
Lesq.	Lesquereux.
Less.	Lessing.
Lestib.	Lestiboudois.
Lév.	Léveillé.
L'Her.	L'Heritier.
L'Herm.	L'Herminier.
Liebm.	Liebmann.
Lightf.	Lightfoot.
Lilij.	Lilijeblad.
Lindb.	Lindberg.
Lindbl.	Lindblom.
Lindenb.	Lindenberg.
Lindh.	Lindheimer.
Lindl.	Lindley.
Linn.	Linnæus. Also *L.*
Linn. f.	C. Linnæus, son.
Lockh.	Lockhart (W.)
Lodd.	Loddiges.
Lœfl.	Lœfling.
Lœs.	Lœselius.
Lois.	Loiseleur-Delongschamps.
Loud.	Loudon.
Lour.	Loureiro.
Ludw.	Ludwig.
Lumn.	Lumnitzer.
Lyngb.	Lyngbye.
Macf.	Macfadyen.
Macgil.	MacGillivray.
Magn.	Magnol.
M. Bieb.	Marschall von Bieberstein.
Marsh.	Marshall (Humphrey).
Mars.	Marsili.
Mart.	Martius.
Mass.	Massalongo.
Mast.	Masters.
Maxim.	Maximowicz.
Med.	Medikus or Medicus.
Meisn. / *Meissn.*	Meisner or Meissner.
Meneg.	Meneghini.
Mens.	Menzies.
Mert.	Mertens.
Metten.	Mettenius.
Mich.	Micheli.
Michx. / *Mx.*	André Michaux.
Michx. f.	F. A. Michaux, son.

Midden.	Middendorff.
Mill.	Philip Miller.
Mill. J.	John S. Mueller or Miller.
Miq.	Miquel.
Mirb.	Mirbel.
Mitch.	John Mitchell.
Mitt.	Mitten.
Moc.	Moçino.
Moen.	Moench, a German botanist.
Molk.	Molkenboer.
Mont.	C. Montagne.
Moq.	Moquin-Tandon.
Moric.	Moricand.
Moris.	Morison.
Morr.	Morren.
Moug.	Mougeot.
Muell. Arg.	J. Mueller of Argau.
F. Muell.	Ferdinand Mueller.
O. Muell.	Otto Mueller of Denmark.
Muhl.	Muhlenberg.
Munt.	Munting.
Murr.	J. A. Murray.
A. Murr.	Andrew Murray.
Nacc.	Naccari.
Næg.	Nægeli.
Naud.	Naudin.
Neck.	Necker.
Nees or *N. ab E.*	C. F. Nees von Esenbeck.
T. Nees.	T. F. L. Nees von Esenbeck.
Nestl.	Nestler.
Newb.	Newberry.
Newm.	Newman.
Nœgg.	Nœggerath.
Nois.	Noisette.
Nord.	Nordstedt.
Not.	Notaris.
Nutt.	Nuttall.
Nyl.	Nylander.
Nym.	Nyman.
Œd.	Œder.
Œrst.	Œrsted.
Oliv.	Olivier.
D. Oliv.	D. Oliver.
Orb.	A. or C. d'Orbigny.
Orph.	Orphanides.
Ort.	Ortega.
Oudem.	Oudemans.
P. de. Beauv.	Palisot de Beauvois.
Pall.	Pallas,
Pans.	Panzer.
Park.	Parkinson.

Parl. =	Parlatore.
Pasq.	Pasquale.
Pav.	Pavon.
Perl.	Perleb.
Pers.	Persoon.
Philib.	Philibert.
Planch.	J. E. Planchon.
G. Planch.	Gustave Planchon.
Pluk.	Plukenet.
Plum.	Plumier, Lat. Plumerius.
Pœpp.	Pœppig.
Poir.	Poiret.
Poit.	Poiteau.
Poll.	Pollich.
Post.	Postels.
Pourr.	Pourret.
Pringsh.	Pringsheim.
Pritz.	Pritzel.
Putter.	Putterlich.
Rabenh.	Rabenhorst.
Radlk.	Radlkofer.
Raf.	Rafinesque-Schmaltz.
Rasp.	Raspail.
Red.	Redouté.
Reich.	Reichard.
Reichenb.	H. G. L. Reichenbach.
Reichenb. f.	H. G. Reichenbach, son.
Reinw.	Reinwardt.
Reiss.	Reisseck.
Retz.	Retzius.
Reut.	Reuter.
Rheed. auct.	Rheede, author of Hortus Malabaricus.
Rich.	L. C. Richard.
Rich. f. / *A. Rich.*	} Achille Richard.
Richards.	John Richardson.
Richt.	Richter.
Ridd.	Riddell.
Riv.	Rivinus.
Rœhl.	Rœhling.
Rœm.	J. J. Rœmer.
M. J. Rœm.	M. J. Rœmer.
Rœm and Sch.	Rœmer and Schultes.
Rœp.	Rœper.
Rohrb.	Rohrbach.
Roscoe.	Roscoe.
Rostk.	Rostkovius.
Roth.	Roth (A. W.)
Rothr.	Rothrock.
Rottb.	Rottbœll.
Rottl.	Rottler.
Roum.	Roumegère.

Roxb. =	Roxburgh.
Roxb. H.Bengl.	Roxburgh's Hortus Bengalensis.
Royle.	Royle.
Royle. Ill.	Royle's Illustrations.
Roy.	Royen.
Rudb.	Rudbeck.
Rupr.	Ruprecht.
Sacc.	Saccardo.
Sadl.	Sadler.
St. Hil.	A. Saint Hilaire.
Salisb.	Salisbury.
Salm-Dyck.	Prince Jos. Salm-Rifferschied-Dyck.
Sauss.	Saussure.
Schimp.	Schimper.
Schk.	Schkuhr.
Schlecht.	Schlechtendal.
Schleich.	Schleicher.
Schomb.	Schomburgh.
Schrad.	Schrader.
Schreb.	Schreber.
Schueb.	Schuebeler.
Schult.	Schultes.
Schultz. Bip.	} C. H. Schultz, Bipontinus (Zweibrucken).
Schum.	Schumacher.
Schnitzl.	Schnitzlein.
Schwægr.	Schwægrichen.
Schwein.	Schweinitz.
Schweinf.	Schweinfurth.
Schwend.	Schwendener.
Scop.	Scopoli.
Seem.	Seemann.
Sendt.	Sendtner.
Seneb.	Senebier.
Ser.	Seringe.
Seub.	Seubert.
Sibth.	Sibthorp.
Sieb.	Sieber.
Sieb.	Siebold.
Sim.	Simmonds.
Sm.	Smith (J. E.)
Soland.	Solander.
Sow.	Sowerby.
Spenn.	Spenner.
Spreng.	Sprengel.
Sternb.	Sternberg.
Steud.	Steudel.
Stev.	Steven.
Stocks	Stocks.
Sull.	Sullivant.
Sw.	Swartz.
Swt.	Sweet (R.)

Tabern. = Tabernæmontanus (J. T.)
Targ. Targioni-Tozetti.
Telf. Telfair.
Ten. Tenore.
Thib. Thibaud deChauvalon.
Thoms. Thomas Thomson.
Thonin Thonin.
Thore Thore.
Thuill. Thuillier.
Thunb. Thunberg.
Thurb. Thurber.
Thurm. Thurman.
Tod. Todaro.
Torr. Torrey.
Torr. & Gr. Torrey & A. Gray.
Tourn. Tour'nefort.
Trans. Linn. Soc. Transactions of the Linnæan Society.
Tratt. Trattinick.
Traut. Trautvetter.
Trev. Treviranus.
Trim. H. Trimen.
Trin. Trinius.
Tuck. Tuckerman.
Turcz. Turczaninow.
Turn. Turner.
Turp. Turpin.
Tussc. Tussac.

Vahl. Vahl (Prof. Martin) of Copenhagen.
Vaill. Vaillant.
Veill. Veillard or Vieillard.
Vauch. Vaucher.
Vent. Ventenat.
Vill. Villars, or Villar.
Vis. Visiani.
Vittad. Vittadini.
Viv. Viviani.
Vog. T. Vogel.

Wahl. = Wahlenberg.
Wahlst. Wahlstedt.
Walds. Waldstein.
Wall. Wallich.
Wall. Cat. Wallich's Catalogue.
Wallm. Wallman.
Wallr. Wallroth.
Walp. Walpers.
Walt. Walter.
Wang. Wangenheim.
Warm. Warming.
Watt. G. Watt.
Wats. P. W. Watson.
H. C. Wats. H. C. Watson.
S. Wats. Sereno Watson.
Web. Weber.
Wedd. Weddell.
Weinm. Weinmann.
Welw. Welwitsch.
Wender. Wenderoth.
Wendl. Wendland.
Wight. icon. Wight's Icones.
Wight. Ill. Wight's Illustrations of Indian Botany.
W. & A. Wight and Arnott.
Wiks. Wikstrom.
Wildb. Wildbrand.
Willd. Willdenow.
Willk. Willkomm.
Wils. Wilson.
Wimm. Wimmer.
Wisliz. Wislizenus.
With. Withering.
Woodv. Woodville.
Wulf. Wulfen.

Zanard. Zanardini.
Zetterst. Zetterstedt.
Zucc. Zuccarini.
Zuccag. Zuccagini.

DICTIONARY

OF

THE ECONOMIC PRODUCTS OF INDIA.

Abaca, a name in the Philippine Islands for Manilla Hemp—**Musa textilis,** which see.

Abele, the Dutch name for the White Poplar, see **Populus alba.**

ABELIA, *R. Br.; Gen. Pl.,* Vol. II., 4.* 1

A genus of shrubs (belonging to the Natural Order CAPRIFOLIACEÆ), containing in all only five species: distributed from Kashmir to China and Japan. They are characterised by having opposite ex-stipulate *leaves. Calyx* adnate to the ovary, *lobes* elongate. *Corolla* regular or nearly so, funnel-shaped, with five short, rounded teeth. *Style* long. *Stigma* capitate. *Ovary* 3-celled, two cells being many-ovuled but early aborted, the other developing. *Fruit* elongated, coriaceous, 1-seeded.

This genus was named by **R. Brown** after the Chinese explorer, **Mr. Clarke Abell.** The species belonging to it are more objects of ornament than of utility. **A. floribunda** from Mexico has purple-red flowers, and **A. rupestris** from China has pale rose-coloured flowers.

There is only one species met with in India.

Abelia triflora, *R. Brown; Fl. Br. Ind.,† III., 9.* 2

Vernacular Names used in different parts of India.—*Adei, paktawar,* PUSHTO (TRANS-INDUS); *Cheta búta,* JHELUM VALLEY; *Ban bakhara, salanker,* CHENAB VALLEY; *Dalúng, kút sái,* RAVI VALLEY; *Zbang, matsbang, peni,* SUTLEJ VALLEY; *Munri, gogatti, kumki,* KUMAON.

Habitat.—A large shrub, met with in Safedkoh and the Suliman Range, North-West Himálaya, between 4,000 and 10,000 feet; also from Kashmír to Kumaon.

Properties and Uses—

Structure of the Wood.—Hard, close, and even-grained. Weight 65 lbs. per cubic foot. TIMBER. 3

Not used, except for walking-sticks.

ABELMOSCHUS, *Medik.; Gen. Pl., I., 208.* 4

A generic name formerly given to a group of species now referred to the genus **Hibiscus.** They are characterised by having an elongated, spathaceous calyx. The word Abelmoschus is derived from the Arabic signifying musk-seeded, in allusion to the odour possessed by the seeds of **Hibiscus Abelmoschus,** *Linn.*

* By Gen. Pl. is meant Bentham and Hooker's Genera Plantarum.
† Fl. Br. Ind. means Sir J. D. Hooker's Flora of British India.

Abelmoschus esculentus, *W.&A.; O'Shaughnessy, Beng. Disp., 217.*
Syn. used by old authors for **Hibiscus esculentus,** *Linn.,* which see.

A. ficulneus, *W. & A.* (as in Drury).
Syn. for **Hibiscus ficulneus,** *Linn.,* which see.

A. moschatus, *Mœnch.*
Syn. used by old authors for **Hibiscus Abelmoschus,** *Linn.,* which see.

A. strictus (as in Voigt).
Syn. for **Hibiscus ficulneus,** *L.,* which see.

5 **ABIES,** *Juss.; Gen. Pl., III., 441.*

A genus of lofty evergreen monœcious trees, belonging to the Natural Order CONIFERÆ, containing some 18 species, widely distributed throughout the colder temperate regions. *Leaves* single, spirally arranged, or in two rows, needle-shaped or narrow, linear. *Male—catkins* single, in the axils of the leaves; *anther-cells* two. *Ovules* inverted, in pairs at the base of the carpillary scales. *Cones* ripening the same year, terminal or lateral, erect or pendulous. *Seeds* oily, winged.

The members of the genus **Abies** are popularly known as the FIRS in contradistinction to the PINES (*Pinus*). Professor W. T. Thiselton Dyer has kindly drawn my attention to the fact that the genus **Abies,** as viewed by Indian authors, has, in the *Genera Plantarum,* been broken up into the following: **Picea,** *Link.,* **Tsuga,** *Carr.,* **Pseudotsuga,** *Carr,* and **Abies,** *Juss.* It was found impossible, however, to effect the rearrangement which this necessitates, owing to the *Genera Plantarum* having only reached my hands after a great part of vol. I. was in type. The correct genera of the Indian species will be found indicated under each.

In India there are three important species:—

6 **Abies dumosa,** *Loudon;* (in *Gen. Pl.* referred to **Tsuga**).

THE INDIAN HEMLOCK SPRUCE.

Vern.—*Changathasi dhúp, thingia, thingúni súla* (*Gamble*) or *tingúri-salla* (*Atkinson*), NEPAL; *Tangshing* or *tungsing,* BHUTIA; *Dárma,* KUMAON; *Tanghing, Surain,* N.-E. KUMAON (*Duthie*); *Semadung* (*Gamble*) or *semadúng* (*Atkinson*), *chemdang,* LEPCHA.

References.—*Brandis, For. Fl., 52; Gamble, Man. Timb., 408.*

Habitat.—A large tree met with in North-East Kumaon, Nepal, and Sikkim, between 8,000 and 10,500 feet. In Kumaon 3,650 acres are under this tree.

Botanic Diagnosis.—*Cones* 1 inch long, occurring on the ends of the branches. *Leaves* white underneath.

Properties and Uses—

RESIN. 7 **Resin.**—Little or nothing is known regarding its resinous properties.

TIMBER. 8 **Structure of the Wood.**—Soft, with a slight pinkish tinge. Weight 27 to 29 lbs. per cubic foot.

Used in Sikkim for shingles. It is suitable for planking and rough furniture.

DOMESTIC. Bark. 9 **Domestic Uses.**—The bark is used for roofing.

10 **A. excelsa,** *DC.;* (in *Gen. Pl.* referred to **Picea excelsa,** *Link.*).

THE SPRUCE FIR OF EUROPE, *Eng.;* POIX DE BOURGOGNE OU DES VOSGES, *Fr.;* FICHTENHARZ, TANNENHARZ, *Ger.*

Habitat.—A noble tree found in the mountains of Central Europe, in Norway, Sweden, and Russia; introduced into India.

Botanic Diagnosis.—This species much resembles the Himálayan **A. Smithiana.**

Properties and Uses—

Description of the Resin.—A yellowish-brown, opaque substance, which RESIN.
naturally exudes from the bark, hard and brittle when cold, strongly 11
adhesive, has an agreeable, aromatic odour, especially when heated.

Chemical Composition.—§ "The resins obtained from the Coniferæ, according to **Maly**, are all similar. The oleo-resinous exudations known as TURPENTINE consist of an amorphous resin $C^{44}H^{62}O^{4}$ mixed with an essential oil or hydrocarbon of the composition $C^{10}H^{16}$. Burgundy Pitch is obtained from **Picea excelsa**; it has been deprived more or less of its essential oil by evaporation, but it is not a turpentine. The so-called Turpentines possess their essential oil; they are obtained from **Pinus Pinaster** (in France) and **Pinus australis** (in America). If exposed to water or moisture the amorphous resin contained in the turpentines combines chemically to a certain extent with the water and becomes opaque and crystalline, being transformed into a substance having the character of an acid. When crude, soft turpentine is distilled, nearly the whole of the OIL OF TURPENTINE passes over while the resin (*rosin* or *colo-*
phony) remains. If this substance still contains a little water it is known Turpentine.
as *yellow rosin ;* if completely deprived of water, it is *transparent rosin ;* Galipot.
and by a continued application of heat it becomes *black rosin.* The crude 12
turpentine which concretes upon the stem is termed in France *galipot* Gum thus.
or *barras.* The American concrete crude turpentine is known in trade as 13
common *Frankincense* or *gum Thus.* OIL OF TURPENTINE is distilled Oil of
from the liquid crude turpentine, collected in *boxes* or artificial cavities cut Turpentine.
on the trunk of the tree. This liquid substance is technically called *Dip.* 14
The first year's flow from a new tree is called *Virgin Dip:* this yields the Rosin or Colophony.
best quality of turpentine oil and of rosin. From the wood of Coniferæ a 15
crystalline glucoside *Coniferin* has been isolated by **Rube.**"

"The essential oils of the various coniferous resins vary considerably. Of the turpentines the two most important varieties commercially are the French and the American; that chiefly used in England being the American. Canada Balsam and Strassburg Turpentine are also well-known coniferous products. Hydro-carbons similar to those obtained from the Coniferæ are also derived from Rutaceæ, Myristiceæ, Lauraceæ, Umbelliferæ, and even from some Labiatæ." (*Surgeon C. J. H. Warden, Prof. Chemistry, Medical College Hospital, Calcutta.*)

Medicine.—The resinous exudation from the stem of **Picea excelsa** MEDICINE.
is officinal in the *Pharmacopœia of India,* and is used as a stimulant and Burgundy Pitch.
rubefacient; always applied in the form of plaster. It is known to Eng- 16
lish writers as BURGUNDY PITCH, although that term, as used by French authors and popularly in many English works, has a wider significance, being applied to the turpentines of other Coniferæ.

Abies Smithiana, *Forbes;* (in *Genl. Pl.* referred to **Picea? Morinda,** *Link.*). 17

THE HIMÁLAYAN SPRUCE.

Vern.—*Wesha, 'bajúr,* AFG.; *Kachal, kachan,* HAZARA, KASHMIR; *Rewari, rái, ban lúdar, sangal, salla, salie, sarei, káulí, roi, rág, ráo, bang ré, krok,* PB. HIMALAYA generally; *Tos,* RAVI; *Rau, raiang, re, ro,* SUTLEJ; *Rái,* JAUNSAR; *Kandre, re, rhái, ráo, rái, khutrau (Brandis*

§ Information specially contributed to this work by the authors whose names follow each paragraph.

and Gamble) or *kudrau (Atkinson), riálla* or *rái ála, rágha, morinda, kail, káluchilu, kilu,* GARHWAL, KUMAON; *Raiyang,* KANAWAR; *Seh-shing,* BHUTIA. *Landar, anandar,* names used at timber depôts.

References.—*Brandis, For. Fl., 527; Gamble, Man. Timb., 407; Stewart's Pb. Pl., p. 210; Atkinson, Gaz., N.-W. P., X., p. 834; Madden, Jour. Agri.-Hort. Soc. Ind., VII, 87; Baden Powell, I., 564.*

Habitat.—A lofty tree met with in the North-West Himálaya between 7,000 and 11,000 feet; in Sikkim and Bhután in the inner valleys between 7,000 and 10,000 feet; and in the mountains of Afghánistan, Kafiristan, and Gilgit.

Botanic Diagnosis.—*Cones* 4-6 inches long, occurring at the ends of the branches, drooping, pale green when young; *scales* persistent. *Leaves* stiff, sharp, 4-sided, green, spirally arranged; when young, crowded into pendulous, tail-like twigs.

An elegant tree, growing rapidly in moist localities where not under too much shade.

RESIN. 18 **Resin.**—It yields a resin, of no importance.

TIMBER. 19 **Structure of the Wood.**—White, with a reddish or brown tinge, a little harder than that of **A. Webbiana.** The inner belt of annual rings soft and spongy. Weight, on an average, 30 lbs. per cubic foot.

The wood is extensively used locally, *e.g.*, in Simla, for packing-cases, rough furniture, and planking, and sometimes for shingles. It crackles and sends out sparks in burning, and is consumed very quickly, but it is in much demand for charcoal.

DOMESTIC. Bark. 20 Leaves. 21 **Domestic Uses.**—The *bark* is used for roofing shepherds' huts, and the *leaves* are collected by the hill-people as a manure, and they are also stored for winter use as a litter for cattle.

22 Abies Webbiana, *Lindl.*; (in *Gen. Pl.* referred to **Picea Webbiana,** *Loud.*).

THE HIMÁLAYAN SILVER FIR.

Syn.—ABIES WEBBIANA, *Lindley*; A. SPECTABILIS, *Spach.*; ABIES DENSA, *Griffith*; PINUS TINCTORIA, *Wall*; P. WEBBIANA, *Wall.*

Var. PINDROW, *Loudon*: the flat horizontal branches of this Western form give it a very distinctive effect from the variety Webbiana proper met with in Sikkim and Bhután.

Vern.—*Palúdar, rewari,* JHELAM; *Bádar, búdar, túng,* KASHMIR; *Dhúnu, rág, rail, pe, re, salle, sara,* CHAMBA; *Tos,* KULU; *Spun, pun, krok, kalrei,* KANAWAR; *Bharda, thanera,* SHALE; *Burla, pindrau, pindrai,* HATTU; *Kúdrom,* MATIYANA; *Burúl, búrra, búldu,* BHAJJI; *Kalrai, satrai, chúr,* KOTKAI; *Raho, row, chilrow, kilaunta,* CHOR; *Morinda,* JAUNSAR; *Bang, dodhma rágha, teliya* or *chili rágha,* SOUTH-EASTERN GARHWAL; *Chilrao,* CENTRAL GARHWAL; *Morunda,* NORTH-WEST GARHWAL; *Raunsla* or *rái salla,* KOSI RIVER; *Rágha, rao rágha, ransla, raisalla,* KUMAON; *Wúman, wumbusing (Mr. Duthie),* BYANS; *Gobria sulah,* NEPAL; *Dumshing,* BHUTIA.

References.—*Brandis, For. Fl., 528; Gamble, Man. Timb., 408; Atkinson, Gaz., N.-W. P., X., 837; Madden, Jour. Agri.-Hort. Soc. Ind., VII., 96.*

Habitat.—A lofty, evergreen tree, met with in the Himálaya, from the Indus to Bhután; in the North-West Himálaya, between 7,000 and 13,000 feet; in the inner ranges of Sikkim and Bhután, between 9,000 and 13,000 feet; in the outer ranges not below 10,000 feet.

Botanic Diagnosis.—*Cones* lateral, erect, 4-6 inches long, solitary or clustered, dark blue when young; *scales* deciduous. *Leaves* flat, narrow, linear, spirally arranged, but spreading in one plane so as to appear distichous.

RESIN. 23 **Resin.**—It yields a white resin, which is sometimes used medicinally in India.

§ "Hakims affirm that the resin of **Abies Webbiana,** mixed with oil of

roses, when taken internally, produces intoxication. This mixture is used externally for headache, neuralgia, &c." (*Surgeon G. A. Emerson, Calcutta.*)

Dye.—**Mr. Duthie,** Superintendent of the Botanic Garden, Saharanpur, has drawn my attention to the fact that **Veitch,** in his *Manual of Coniferæ,* states that "a beautiful violet dye is extracted from the young cones" of this plant. It is remarkable that neither **Stewart, Brandis,** nor **Gamble** alludes to this dye, while in *Gordon's Pinetum* occurs the following: "It is called *Rai-sulla* (fragrant fir) and *Gobrea-sulla* (fragrant or indigo fir) by the Gorkhalis on account of an indigo or purple pigment being extracted from the young cones." It would be exceedingly interesting to have this dye properly confirmed by fresh information, and specimens of the dye-stuff and cloths dyed by this process, also information as to the extent this curious dye is actually used by the hill tribes of India. DYE. Young Cones. 24

Medicine.—The dried leaves of this plant (*Tálíspatra,* HIND. and BENG., *Tálísapatra,* SANS.) are regarded as carminative, expectorant, stomachic, tonic, and astringent; useful in phthisis, asthma, bronchitis, and catarrh of the bladder. The powdered leaves are often given along with the juice of **Adhatoda Vasica** and honey, and a confection called *tálísádya churna* is prepared from the *tálíspatra* along with pepper, ginger, bamboo manna, cardamoms, cinnamon, and sugar. The *tálíspatra* also enters into the preparation of numerous complex prescriptions. (*U. C. Dutt's Hindú Mat. Med.*) In **Ainslie** and the earlier writers on Indian Economic Botany, *tálíspatrie, tálísapatra,* DUK. and HIND., and *tálísha, vidara,* SANS., are the vernacular names for the dried leaves and twigs of **Flacourtia Cataphracta,** the *paniyala* of Bengal. (*Ainslie, II., 407.*) MEDICINE. Leaves. 25

In his *Manual of Indian Timbers,* p. 17, **Mr. Gamble** gives *tálíspatri* as the Hindi name for **Flacourtia Cataphracta,** *Roxb.,* and this is also the name given by **Babu T. N. Mukharji** in his *Amsterdam Catalogue.* **Surgeon U. C. Dutt** informs me that he is of opinion **Abies Webbiana** is the *tálíspatra* of the ancient Sanskrit writers, and that specimens of the drug which he submitted to Dr. King were found to be the leaves and twigs of this plant. It seems difficult to account, however, for a man of **Dr. Ainslie's** ability mistaking the ovate leaf of a **Flacourtia** for the needle-shaped leaves of a Fir, and, having few or no authors to compile from, he must have personally identified the plants of which he wrote, and ascertained locally that **Flacourtia** was the *tálísha* of the shops of South India.

The Hindú Doctors of Behar, according to **Dr. F. Hamilton,** use an infusion of *tálíspatra* in the treatment of hoarseness. It is probable that, in different parts of India, the dried leaves of various plants receive the name of *tálíspatra,* provided they are found useful in the treatment of coughs. It seems likely, however, that the leaves of **Abies Webbiana** are the original or true *tálíspatra.*

Dr. Dymock states that the *tálíspatra* of the Bombay shops (also called *Barmi*) consists of the leaves and young shoots of **Taxus baccata,** *Linn.* While admitting that the *tálíspatr* of the ancients has not been identified for certain, he quotes under **Taxus** the properties and mode of prescribing the *tálíspatr* as given by **Surgeon U. C. Dutt,** an author who refers it to **Abies.** The importance of this observation lies in the fact that the therapeutic properties of **Abies** and **Taxus** are widely distinct, and therefore these distinct plants, one would imagine, could not possibly be used for the same purposes. (See **Taxus.**) Since writing the above, however, I have seen in Calcutta a specimen of a drug called *tálíspatra,* which I believe to be the leaves of **Taxus,** and **Mr. Woodrow** says that it is the leaves of that plant which are sold in Poona as the *tálíspatr.* The whole subject is thus exceedingly obscure.

ABIR. **The Hindú Abír and Gulál Powders.**

MEDICINE. The description of the *tálíspatra* in some of the older books on Indian medicinal plants would agree very well with the leaves of a **Cinnamomum**,—much better, in fact, than with those of an **Abies**. **Surgeon Moodeen Sheriff** gives *tálíshapatri* as the Tamil and Telegu names for **C. Tamala**, *Nees* and also the Arabic and Persian for the leaves of that plant. He may be quite right in this opinion, modern usage having appropriated the name to **Abies** and **Taxus**. But one only of the plants referred to in this critical note can be the true *tálíspatra* since they have such distinct properties. It seems clear, however, that in different parts of the country different plants are prescribed as *tálíspatr*, and it is quite probable that none of them are the true *tálíspatra* of the Sanskrit writers.

26 **Special Opinions**.—§ "*Tálíspatra* (leaves of **Abies Webbiana**) are sold in all *Baniahs'* shops in Bengal, Behar, and the N.-W. Provinces. I do not think any other leaf is used in these provinces under the name of *Tálíshapatri*." (*Surgeon U. C. Dutt, Serampur.*) "The *Tálíspatra* of the Bombay shops, also called *Barmi*, consists of the leaves and young shoots of **Taxus baccata**. *Many of the shoots bear the male flowers of that plant.* If this is the source of the *Tálíspatra* of Sanskrit writers, we ought to have a Sanskrit name *Talish* for the tree, and the Hindi name would probably be similar." (*Surgeon-Major W. Dymock, Bombay.*) "The same argument is equally against **Taxus baccata**, since in no Indian language is the tree called *tálísha*, nor by any name that could be called a derivative from that word." (*G. Watt.*) "The Bhuj Hakim uses the dried leaves when a carminative action is needed, dose half to one drachm internally." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*)

27 "The juice of the fresh leaves is used as a family medicine in fevers, acting as an antiperiodic, for infants dose 5-10 drops in water or mother's milk. It is also prescribed in affections of the chest and during dentition. In Bengal it is given as a tonic after parturition." (*Surgeon J. McConaghey, Shahjahanpur.*)

FODDER. Leaves. 28 **Fodder**.—In tracts near the Jhelum the twigs and leaves are cut and stored for winter use as fodder and litter for cattle. (*Brandis.*) That cattle could eat the dried leaves of this plant seems incredible and at strange variance with their reputed medicinal properties.

TIMBER. 29 **Structure of the Wood**.—White, soft. The inner zone of each annual ring is soft and spongy. Weight about 29 lbs. per cubic foot.

The wood is not durable when exposed to the weather, but seems to last well as shingles in Sikkim, whence it is sometimes exported to Thibet for roofing. At Murree, shingles are said to last eight to ten years, and in Kulu three to six. In Kanawár and Lahoul it is much used for construction. Very little information exists regarding the rate of growth.

DOMESTIC. Bark. 30 **Domestic Uses**.—The bark is used for roofing shepherds' huts, and it is also made into troughs for the salt given to the sheep grazing on the higher Himálaya.

ABIR.

31 **Abir** (sometimes called *Phák*, Beng., or *Phaku*, Ass.), or the white perfumed powder which is mixed with the red *Gulál* powder and used at the *Holi* festival.

Dr. McCann, in his *Dyes and Tans*, publishes, from the records of the Bengal Economic Museum, as the practice adopted in Mymensing, the following description :—

Bengal Powder with *bakram*. 32 *1st*.—"The *shati* is washed and pounded in a *dhenki*. The powder is then put into an earthen vessel full of water and allowed to rot. The water is afterwards poured off, and the powder dried. It is then mixed with the juice extracted from *bakram* wood. This turns it red, and it is then called *Abír* or *Holi* powder. *Shati* is gathered for this purpose in the

ABIR.

month of *Poos* (December-January)." There is no mention of alum in the above, but without that substance the colour could not be produced.

The practice which seems to prevail in most other parts of India is to prepare the two powders quite distinct from each other, and to mix them as required.

Bengal Powder with aniline 33

2nd.—The Bengal *Holi* powder is prepared from **Curcuma Zedoaria,** *Roscoe* (or common flour or arrow-root), Sappan-wood, and alum. "In Bengal aniline magenta is now largely used to colour the flour obtained from **Zedoaria,** and being cheaper has almost superseded the older preparations." (*Mr. T. N. Mukharji, Calcutta.*) **Dr. Buchanan Hamilton** says that in some parts of Bengal the yellow dye obtained from **Bixa Orellana** is used as a *gulál.*

Dr. Dymock has favoured me with the following list (Nos. 3 to 7) of *Abír* powders:—

Bombay Powder. 34

3rd.—"The Bombay *Holi* powder or *Gulál* is made of flour coloured with Sappan-wood and alum." (*Surgeon-Major W. Dymock, Bombay.*)

White Abir. 35

4th.—A whitish *Abír* made from the following:—

Andropogon muricatus. **Hedychium spicatum.**
Santalum album. **Sorghum vulgare** (flour).

Ghisi Powder. 36

5th.—The buff-coloured Hindi *Gulál,* known as *Ghisi,* contains, in addition to the above, the following:—

Cerasus (Prunus) Mahaleb. **Artemisia Sieversiana** (imported).
Cedrus Deodara. **Curcuma Zedoaria.**
Cloves. Cardamoms.

Bukka or Deccan Abir. 37

6th.—Deccan *Abír* or *Bukká* is of a black colour, and in addition to all the above contains the following:—

Aquilaria Agallocha.

Costus Root (**Saussurea Lappa,** *C.B.C.,* formerly *Aucklandia Costus, Falc.*); Jatamansi; Liquid Storax.

Jain Abir 38

7th.—The *Abír* of the Jains is of a pale yellow colour. It is called *Vasakshep;* it is made of—

Santalum album. Saffron; Camphor (Borneo); Musk.

Pulas Gulal. 39

8th.—**Voigt** in his *Hortus Sub. Calc.,* states that **Trapa bispinosa** (the Singara nut) is used as an *Abír.* "During the *Holi* festival a red dye is made of it mixed with the yellow dye procured from the flowers of **Butea frondosa.**" **Drury** apparently quotes this paragraph. I presume the flour of the Singara nut is simply used in place of rice or wheat flour and coloured with the *gulál.* My friend **Major Pitcher** informs me, however, that in Oudh the flour from the Singara nut is used during the *Holi.* **Professor W. T. Thiselton Dyer** also writes me that a specimen of *Abír,* composed of Singara-nut flour, coloured with **Butea frondosa,** was received by the Kew authorities from the late Indian Museum. It would thus appear that the use of Singara-nut flour is more general than was thought. What peculiar merit it is supposed to possess I have been unable to discover. The use of **Butea frondosa** as *Gulál* is, however, referred to by several authors. See **Butea.**

Absorbent—(L. *ab,* from; *sorbeo,* I suck up). Applied adj. and subs. to anything which absorbs acidity in the intestinal canal, or blood and other fluids, from any part of the body. For list of Indian Absorbents, see "Drugs."

ABROMA, *Jacqr.; Gen. Pl., I., 224.* 40

A genus of trees or shrubs (belonging to the Natural Order STERCULIACEÆ), containing in all two or at most three species, natives of tropical Asia. *Leaves* cordate, angled. *Petals* purple-coloured, concave at the base, with

An Important Fibre.

a stipulate, ovate blade. *Andræcium* tubular, *stamens* 1-seriate, *anthers* marginal, 2-4 between each staminode. *Capsule* membranous, 5-angled and 5-winged. *Seeds* numerous.

The word Abroma is derived from ἁ and βρῶμα—unfit for food.

41 **Abroma augusta,** *Linn.; Fl. Br. Ind., I., 375.*

ABROME, *Fr.;* ABROME, *Ger.*

Vern.—*Ulatkambal,* BENG., HIND., and CUTCH.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 510; Gamble, Man. Timb., 45; Atkinson, Gaz., N.-W. P., X., 792; Drury, U. P., 2; U. S. Dispens., Ed. 15th, 1559.*

Habitat.—A small bush, widely distributed (native or cultivated) throughout the hotter parts of India.

Botanic Diagnosis.—A large spreading shrub, with leaves and branches softly hairy. *Sepals* lanceolate, almost free to the base, and nearly as long as the petals; *fruit* becoming more than twice the length of the persistent calyx. It flowers most profusely during the rains, and the seeds ripen in the cold season.

Properties and Uses—

FIBRE. Bark. 42

Fibre.—The bark of the twigs yields a much-valued fibre, which deserves to be more generally known. It might be used with advantage as a substitute for silk. The plant yields three crops a year. **Roxburgh** says of this plant: "The bark abounds with strong, white fibres, which make a very good substitute for hemp, and as the plant grows so quickly as to yield two, three, or even four crops of cuttings annually fit for peeling" it may with advantage be cultivated for its fibre. It is a large and more easily cultivated plant than jute or *sunn*, and is a perennial, while the produce is as great if not greater, and the fibre as easily separated. With all these facts to recommend it, it seems remarkable that we should have had to urge the claims of this fibre for over 50 years without its having attained the high commercial rank which its great beauty, softness, cheapness, and durability deserve. There are many purposes to which jute is put nowadays, which Abroma could meet with greater acceptance, and which it most certainly would, by this time, have supplied but for the unparalleled early success of jute. The future seems likely to raise Abroma, however, to a position of great importance.

"To separate the root-bark from the shoots, maceration in stagnant water, from four to eight days, answers well during the warmer parts of the year, while three times as much is scarce sufficient during the cold season: indeed, the process is scarcely practicable then; besides, the fibres are generally weakened by prolonged maceration. The fibres being naturally very white and clean, they do not require to be cleansed. **Dr. Roxburgh** states that, in its native state, without being dressed in any way, it is about one tenth part stronger than *sunn*, and in that state much more durable in water. A cord of its fibre bore 74 lbs., when *sunn* broke with 68 lbs." (*Royle's Fibrous Plants of India, p. 267.*)

There can be no doubt that sooner or later the trade in jute, having lost the enormous profits obtained during its early history, will subside into an old and established industry. The demand for some new fibre to give life to the progressive textile industries will then turn to **Abroma, Agave, Yucca, Abutilon,** and a few others; but to the owners of jute mills and jute machinery, **Abroma** seems the most likely to prove the new outlet for enterprise.

MEDICINE. Root-bark. 43

Medicine.—The bark of the root is an emmenagogue, which does not appear to have received the attention it deserves. In the *Indian Medical Gazette* for 1872, **Mr. Bhoobun Mohun Sircar** gives an account

MEDICINE.

of the uses of this drug, specially recommending it in the treatment of dysmenorrhœa. It seems to be the fresh viscid sap from the root-bark which possesses the properties attributed to this plant. Half a drachm is given at a dose. (*Am. Jour. Med. Science, July 1873, p. 276.*)

Dr. Kirton, in a correspondence with the Home Department, Government of India, says: "Fresh root, beat into paste with water, dose 1 drachm in dysmenorrhœa."

Special Opinions.—§ "Is a valuable medicine in dysmenorrhœa. The way in which it is usually given is, the fresh root of the plant made into a paste with black pepper. The medicine is given about a week before the menstruation begins and is continued till it commences. I have seen it prove very efficacious in some cases; especially the congestive form of the disease." (*Surgeon R. Macleod, M.D., Gya.*) "Two ounces of dried bark boiled in one pint of water will make a good decoction. An ounce thrice daily acts well in cases of dysmenorrhœa." (*Surgeon R. L. Dutt, M.D., Pubna.*) "Have never used it as an emmenagogue, but the infusion of fresh leaves and stems in cold water is demulcent and very efficacious in gonorrhœa." (*Surgeon C. J. W. Meadows, Burrisal.*) "A well-known emmenagogue in Bengal: said by some native doctors to possess antispasmodic properties." (*Surgeon J. McConaghey, Shahjahanpur.*) "Useful in dysmenorrhœa." (*Surgeon J. Anderson, Bijnor.*) 44

"The slender roots of this plant are useful in the congestive and neuralgic varieties of dysmenorrhœa. It regulates the menstrual flow and acts as a uterine tonic. It should be given during menstruation, 1½ drs. of the fresh root for a dose, with black pepper, the latter acting as a stomachic and carminative." (*Brigade Surgeon J. H. Thornton, Monghyr.*) "I have tried the green tender roots and also the bark of roots in two-drachm doses with a few grains of pepper just to cover the bland taste of it in congestive dysmenorrhœa with excellent results. It is to be given as soon as the vague sense of discomfort and weight in the loins begins and should be continued till the flow appears." (*Assistant Surgeon Devendro Nath Roy, Sealdah, Calcutta.*) 45

"I used the root-bark in three cases of dysmenorrhœa, in which it was vaunted as a specific, but without any effect." (*Surgeon Shib Chunder Bhattacharji, Chanda, Central Provinces.*) "Babu B. M. Sarkar of Calcutta is selling pills made of this as a successful remedy for dysmenorrhœa, and I have heard of good effects from it. Requires a trial." (*Surgeon K. D. Ghose, Khulna.*) "Action tonic." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "Has never failed in my hands in speedily relieving painful dysmenorrhœa." (*Surgeon B. Evers, M.D., Wardha.*) "In my personal experience, I know the root is very efficacious in cases of amenorrhœa as an emmenagogue." (*Assistant Surgeon Shib Chunder Basu, Bankipur.*) "Reported to be an emmenagogue; said to remove sterility in cases depending on dysmenorrhœa, but it has failed in two cases in my hand." (*Assistant Surgeon Bolly Chand Sen, Sealdah, Calcutta.*) 46

ABRUS, *Linn.; Gen. Pl. I., 527.* 47

A genus of climbing shrubs (belonging to the Sub-Order PAPILIONACEÆ, of the Natural Order LEGUMINOSÆ) comprising 5 species, cosmopolitan in the tropics. *Leaves* equally pinnate; *leaflets* numerous and deciduous. *Calyx* campanulate, teeth short. *Corolla* much exserted, standard adhering below to the staminal tube. *Stamens* 9, united into one bundle, the uppermost and tenth one being abortive. *Pod* dehiscent (exposing the red shining seeds), not jointed.

The word Abrus is derived from the Gr. ἁβρός, graceful, either in allusion to the graceful, delicate leaves, or elegant, shining seeds.

Indian Wild Liquorice.

In India there are three species, closely allied and economically viewed as but forms of one species. These may be briefly distinguished thus:—

48 **A. precatorius,** *Linn.* Pod oblong, turgid, 3-5 seeded.

49 **A. pulchellus,** *Wall.* Pod linear, flat, incurved, 9-12 seeded.

50 **A. fruticulosus,** *Wall.* Pod linear, oblong, flattish, 4-6 seeded.

51 **Abrus precatorius,** *Linn.; Fl. Br. Ind., II., 175.*

INDIAN or WILD LIQUORICE ROOT, *Eng.*; LIANE À RÉGLISSE, RÉGLISSE D'AMÉRIQUE, *Fr.*

Vern.—*Gaungchi, rati, chirmiti,* HIND.; *Ratak, labri,* PB.; *Gunjá, ghungchi,* BOMB.; *Gumchi,* DUK.; *Chanoti,* GUJ.; *Rati,* CUTCH; *Maspati,* NEPAL; *Kunch, gunch, chun-hati,* BENG.; *Kawet;* SANTAL; *Latuwani,* ASS.; *Gunja, gunjá, krishnala, kakachinchi,* SANS.; *Aainu-ddik,* ARAB.; *Chashmkhurós,* PERS.; *Gundumani,* TAM.; *Ghurie-ghénsá* TEL.; *Ywe-guwe* or *gyin-ywe,* BURM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 544; Drury's U. P., p. 3; Brandis, For. Fl., 139; Gamble, Man. Timb., 121; C. I. H. Warden, in Year Book Phar. 1882, p. 211; Flück, and Hanb., Pharmacog., 2nd ed., 188; Bentl. and Trim., Med. Pl., 25; Dymock's Drugs of W. Ind., p. 183; Stewart's Pb. Pl., p. 50; Atkinson, Gas., N.-W.P., X., pp. 7, 24, 767.*

Habitat.—A beautiful climber, met with all along the Himálaya ascending to altitude 3,000 feet, and spreading through the plains of India to Ceylon and Siam.

Botanic Diagnosis.—There are three principal varieties under this species described by **Roxburgh**:—

1st—With rose-coloured flowers and red seed, with black eye.

2nd—With dark-coloured flowers and black seed, with white eye.

3rd—With white flowers, white seed.

§"The white variety as seen here has no black eye." (*Dr. Dymock, Bombay.*)

Properties and Uses—

MEDICINE. Root. 52

Medicine.—THE ROOT, **Ainslie** and **O'Shaughnessy** say, "is a perfect substitute for liquorice in every way." Modern authors differ from them in this opinion. According to Sanskrit writers it is emetic and useful in poisoning. **Dr. Bidie** says: "The Abrus root has little or no saccharine taste, and would form a very indifferent substitute for liquorice." Liquorice root is largely imported into India and extensively used in native medicine, and is probably often sold under the same vernacular name as that given to the Abrus root. **Dr. Dymock,** speaking on this subject, says: "I consider the root to bear very little resemblance to liquorice, either as regards appearance or qualities; as pointed out by **Dr. Moodeen Sheriff,** the leaves are by far the sweetest part of the plant, and from them a tolerable extract may be made." An alkaline ash is prepared from the plant.

53 § **Special Opinions.**—"The root of the third variety, as described by **Roxburgh,** is used for gonorrhœa. A quantity equal to a drachm in weight is pounded, and the expressed juice mixed with sugar-candy." (*Surgeon H. McCalman, M.D., Bombay.*) "At Poona *Safed Gunja* is considered the best variety, and accordingly under this name **Glycerrhiza glabra** is sold in the bazars. The root of **Abrus precatorius** appears to have fallen much out of use of late." (*G. M. Woodrow, Prof., College of Science, Poona.*) "An infusion of the roots is used for procuring abortion in Hoshiarpur District, Panjáb." (*W. C. Coldstream, Esq., Commissioner, Hissar.*)

54 "Further experience confirms the view that the root of this plant is not a substitute for liquorice, and that the article sold in the bazars as 'Indian liquorice' is not the root of **Abrus precatorius.** I would therefore strike out everything connecting liquorice with **Abrus.**" (*Deputy Sur-*

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geon-General G. Bidie, C.I.E., Madras.) "The powdered root, with ginger and other carminatives, is much used for coughs, including hooping-cough: Dose—5 to 7 grains. A cold infusion of the root is also used in leucorrhœa." (*Narain Misser, Hoshangabad, Central Provinces.*)

"Not equal to liquorice, but a fair substitute; used chiefly in the form of infusion, ½ oz. of the root-bark to 10 oz. water: dose one to two ounces." (*Apothecary Thomas Ward, Madanapalle, Cuddapah.*) "I often use a decoction of bazar liquorice in cough mixtures, and find it very useful, especially in the bronchitis of children." (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*) 55

THE LEAVES.—§ "If the leaves are steeped in warm mustard oil, and applied over the seat of pain in rheumatism, much benefit will be derived." (*Surgeon W. Wilson, Bogra.*) Leaves. 56

"The leaves, warmed over the fire, are applied to painful swellings, over which a little warm castor-oil is first smeared. In this way they are said to be antiphlogistic in their action." (*Hon. Surgeon P. Kinsley, Chicacole, Ganjam, Madras.*) "Juice of fresh leaves, mixed with some bland oil, and applied externally, seems to relieve local pain." (*Surgeon-Major Bunkabehari Gupta, Púri.*)

THE SEEDS.—In his *Sanskrit Materia Medica* Surgeon U. C. Dutt says the seeds are "used internally in affections of the nervous system and externally in skin diseases, ulcers, affections of the hair." They are pounded and made up with mercury, sulphur, *ním* seeds, hemp leaves, and cotton seeds, &c. Seeds. 57

§ "The seeds are used as a purgative, but in large doses are an acrid poison, giving rise to symptoms resembling those of cholera. The poisonous property is generally believed to be in the red covering of the seed." (*Surgeon-Major A. S. G. Jayakar, Arabia.*) 58

"When boiled with milk it is said to have a very powerful tonic action on the nervous system. Dose of the powder boiled with milk, one to three grains. The powder, when administered internally, *uncooked*, acts as a strong purgative and emetic." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "The white seeds are made into confection with several other drugs and used as tonic. A *Vaid* tells me that the roots are similarly used." (*Surgeon-Major J. Robb, Ahmedabad.*) "Used in granular chronic conjunctivitis causes slight inflammation and absorption of the granulation." (*Surgeon H. D. Masani, Karachi.*)

"If the colour of the seeds is sufficient to constitute a variety, there are more than 10 varieties of **A. precatorius**; some seeds are entirely black, white, yellow or rosy, and such seeds are more used in medicine than those described by Dr. Roxburgh as having an eye of a different colour. Taken internally by women, the seeds of **A. precatorius** disturb the uterine functions and prevent conception. For the latter purpose, 4 to 6 seeds are swallowed every day in 2 doses for several days after each menstruation. The white and black seeds are preferable to those of other colours." I am aware of one successful case under this treatment. The white seeds, again, are considered deobstruent or repellant. Rubbed up with water and applied to swellings, they succeed in some slight cases." (*Hon. Surgeon Moodeen Sheriff, Khan Bahadur, Madras.*) 59

"I presume that this plant is the one referred to by Major Ramsay, of the Bengal Police, in his book, Detective Foot-prints, Bengal, 1874-81, London, Army and Navy Co-operative Society, 1882. He calls the plant *Korgani*; his description at page 44 agrees. The seed is used for killing cattle. Consult the reference." (*Surgeon L. Cameron, Nuddea.*) "The powdered seeds are taken as snuff in cases of violent headache arising from cold." (*Mr. T. N. Mukharji, Calcutta.*) "The boiled seeds are 60

Opinions regarding the Gunja.

CHEMISTRY. said to possess powerful aphrodisiac properties." (*Surgeon-Major J. M. Honston, Travancore, and Civil Apothecary John Gomes, Travandrum.*)

"The seeds rubbed down with a small quantity of water (paste) is used for contusions, &c., to reduce the inflammation." (*Surgeon W. A. Lee, Mangalore.*)

61 "The root is a good substitute for imported liquorice. The seeds are poisonous and used by the *chamars* for poisoning cattle; they are poisonous when mixed with the blood, but not so when taken internally. I treated a case at the Bankipore Hospital who died with symptoms of nervous excitement. On *post mortem* examination no trace of the drug could be detected, only there was a suppurative spot with inflammation all around it, and the brain was highly congested." (*Asst. Surgeon Bolly Chand Sen, Calcutta.*)

62 "Prescribed as a general tonic, and, mixed with milk and cardamoms, natives use it as an aphrodisiac. In large doses it is emetic. A mixture consisting of vinegar 2 parts, sugar 3 parts, and lime-juice 1 part, acts as an antidote to the poison—dose 67 grains." (*Surgeon J. McConaghey, Shahjahanpur.*) "The seeds, mixed with the roots and cocoanut milk, are given in hæmorrhoids according to **Rheede.**" (*Surgeon H. W. Hill, Mánbhúm.*)

63 "The seeds, when decorticated and finely ground, are used for treatment of pannus cornea and for granular lids with good effect. They cause a true purulent ophthalmia, and in cases where too vigorously used in diphtheritic exudation on the conjunctiva. In mild cases of pannus and granular lids the treatment need not be carried beyond the purulent stage. But in severe cases diphtheritic exudation must be caused before good results are procured. A 3 per cent. solution, prepared by steeping the decorticated seeds in cold water for 24 hours, brushed over the reversed lids three times a day, will cause purulent ophthalmia. In bad cases a 5 per cent. infusion is required. Moderate ulceration of the cornea is not a contra-indication for the use of this remedy; on the other hand the ulceration speedily improves." (*By a Surgeon.*)

Off. Preparation.—An extract of **Abrus** root is regarded as officinal in the Indian Pharmacopœia, dose *ad libitum*.

64 **Description.**—The root is woody, tortuous, and much-branched, about ½ inch in thickness. Section not broken up by medullary rays into wedge-shaped blocks as in the true liquorice. Bark thin, reddish brown; wood yellowish white. Odour, when broken, peculiar and disagreeable. Taste at first bitter, then sweet.

65 **Chemical Composition.**—In 1882, **Dr. de Wecker** directed attention to the fact that the **Abrus precatorius** seeds, used in the form of a lotion, were capable of producing purulent inflammation of the conjunctiva. He advanced the theory that this was due to the presence of a bacillus, and stated that if an infusion of the seeds be sterilized, it is no longer capable of exciting inflammation: if the bacillus be cultivated separately, it will set up the factitious ophthalmia. That when inoculations were carried very far, a transmission to the lymphatic glands took place, causing suppuration and erysipelatous symptoms, as well as a distinctly febrile condition. (*Jour. Ph. Soc.*)

66 It has been observed by **Dr. Nicholson** that Abrus seeds are sometimes found on prisoners in jail. Sudden attacks of ophthalmia in jails may perhaps often be factitious. The action of the Abrus seeds in establishing purulent inflammation is at all events well known. According to **Dr. de Wecker**, the ophthalmia set up by Abrus seeds disappears in ten days or a fortnight without any therapeutic intervention or danger to the cornea, and he therefore recommends a lotion, prepared from 155 grains of the decorti-

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cated and powdered seeds, macerated in 17 ounces of cold water for 24 hours, and then filtered, in the treatment of certain eye diseases in which it may be necessary to produce purulent conjunctive inflammation. The theory that this infusion of the seeds of **Abrus precatorius** owes its power of producing ophthalmia to the action of a bacillus, has by this time no doubt been abandoned even by its first propounders, **Messrs. de Wecker** and **Sattler. Warden** and **Waddell** have conclusively proved that the Abrus poison or *abrin* is a proteid closely allied to ordinary albumen, that it is insoluble, and is present not only in the seeds, but also in the stem and root of the **Abrus precatorius.** They further show that *abrin* produces its poisonous effect when injected subcutaneously, but not when ingested. (*Practitioner, XXXII., 135, 437.*)

My attention has been drawn to some interesting information regarding the chemistry of this plant, but too late unfortunately, to be taken advantage of. See *The Lancet,* July and August 1884.

§ "It has been proved that the action is not, as supposed, due to a bacillus, but to some peculiar chemical constituent not yet isolated; see papers in *American Druggist,* 1884, pp. 103 and 105. An alcoholic dialysate of **Abrus** was found very active; hence bacilli can certainly not be the cause." (*Dr. Charles Rice, New York.*) 67

FOOD. Seeds. 68

Food.—The seeds, known vulgarly as Crab's eyes, are said to be used in Egypt as an article of food, and are wholesome when boiled; if eaten in any quantity, however, they produce violent headache.

When injected under the skin they are poisonous. Heat, with moisture, however, destroys completely this poisonous principle, hence when cooked they become inert, or if simply eaten the heat and moisture of digestion destroys the poisonous property. A temperature of 100° C. will destroy completely the activity of the poison.

POISON. Sui. 69

Poison.—**Dr. Warden,** experimenting with the poisonous property of the seeds, found that half a seed rubbed down with a small quantity of water and injected into the thigh of a full-grown cat produced fatal effects in 24 hours. He succeeded in isolating an acid which he called Abric Acid; it proved to be non-poisonous. While the seeds used in this manner are highly poisonous, it is remarkable, as stated above, that when boiled they may be eaten.

Special Opinions.—§ "The seeds are used by sweepers and *chamars* to poison cattle. From the throat of a bullock suffering from symptoms of poisoning resembling narcotism, I once extracted a bamboo containing bruised *ratak* seeds, loosely tied with hair. The animal died the same day. Iron needles, soaked in a paste made from the ground seeds, are also used. I once extracted a black ball made of wax and *ratak* seeds from the vagina of a cow." (*Asst. Surgeon Bhagwan Dass, Rawal Pindi.*) 70

"The seeds are powdered and made into a little cylinder called *sui,* almost exactly resembling a silver nitrate point. A puncture is made in the skin and the *sui* pushed in. The animal soon becomes uneasy, and if discovered and the *sui* cut out, the animal may live." (*Surgeon-Major C. W. Calthrop, M.D., Morar.*) "The powdered seed is made up into a paste and formed into short sharp pieces (called *sui* or needles) used by cattle-poisoners. The *sui* is inserted under the skin of the animal, causing inflammation and death." (*W. C. Coldstream, Esq., Commissioner, Hissar, Panjáb.*) "The pulp of the seed, made into small needles called '*sutari,*' is used for poisoning cattle in Behar. I gave evidence in a case of this nature before the Sessions Judge of Patna." (*Asst. Surgeon Shib Chunder Basu, Bankipur.*)

DOMESTIC. Seeds as a weight 71

Domestic Uses.—The small, shining, red seeds, *rati* or *ghungchi,* are largely used by the Indian goldsmiths as weights, each weighing about 1·75 grains; in the Panjáb they are regarded as of correct weight when

DOMESTIC.

equal to about eight grains of *bansmatti* rice (*Mr. Coldstream*). It is stated that the famous *Koh-i-núr* diamond was first weighed by the *rati*, a word which, by some authors, is supposed to have given origin to the jewellers' carat (*kírát*, ARAB.). The carat is the twenty-fourth part of an ounce or $3\frac{1}{6}$ grains; this approximately would be equal to two *rati* seeds. The climber, with its open, withered fruits, exposing the scarlet *rati* (or crab's eye) seeds, is twisted round leafy boughs to simulate the holly at Christmas time in English stations.

A Necklace. 72 As Ornaments. 73 A Rosary. 74 75

The *rati* are also extensively used for necklaces, ornaments for the ears, and to decorate small boxes, baskets, &c. The fact of their being used as rosaries doubtless suggested the specific name *precatorius*.

76 **Abrus precatorius,** *Linn.*, var. **melanospermus,** *L.* (as in Voigt's Hort. Sub. Calc., p. 228.)

Syn. for **A. pulchellus,** *Wall*, which see under generic note.

Absinthe—An intoxicating liquor, largely consumed by the French, prepared in Europe from one or two species of Wormwood, but chiefly from **Artemisia Absinthium,** *Linn.*, which see.

Abstergent—A term applied in Pharmacy to a substance such as Fuller's earth, which has a cleansing property. The Soap-nut (**Sapindus Mukorossi,** *Gærtn.*) is an excellent abstergent or detergent, and so also are the pods of **Acacia concinna.** See under "Soap Substitutes" for other natural abstergents.

ABUTA, *Aubl.*

77 **Abuta rufescens,** *Aubl.; DC. Prod., Vol. I., 103.*

Said by **O'Shaughnessy** to be considered Ceylon as an excellent stomachic, and used for the same purpose as Cissampelos. The plant is a native of Cayenne and Guiana, and if used in Ceylon must be imported.

78 ABUTILON, *Gærtn.; Gen. Pl., I., 204.*

A genus of herbs or under-shrubs (belonging to the Natural Order MALVACEÆ), containing about 70 species, all inhabitants of the tropical or sub-tropical regions. *Leaves* softly tomentose, cordate, angled, or palmately lobed. *Bracteoles* none. *Staminal-tube* divided at the apex into numerous filaments. *Carpels* 5 or more, entire (*i.e.*, not divided by a false partition), when ripe separating from the axis. *Styles* as many as the carpels.

The word Abutilon is said by some authors to be an ancient Greek name for the Mulberry tree, and to be given to this genus in allusion to the resemblance of the foliage. **Dr. Rice** writes me, however, that the word does not occur in old Greek authors, but appears to have been first used by **Avicenna.** The members of this genus are annual or perennial low bushes, growing gregariously and forming clumps in the jungles. There are 10 or 12 Indian species, most of which are very abundant in the plains, and yield beautiful white fibres. The flowers of **A. esculentum,** a Brazilian species, are edible. The leaves of all contain a large quantity of mucilage, and are used in the same manner as the Marsh-mallow of Europe.

The allied genera are readily separated from **Abutilon** by the number and position of the ovules. In **Althæa** they are solitary, ascending; in **Sida** solitary, pendulous; while in **Abutilon** there are two or more ovules in each carpel, one ascending and another pendulous from the top and bottom of the carpel.

The following are the more important Indian species of Abutilon:—

79 **Abutilon asiaticum,** *G. Don*, and **A. indicum,** *G. Don*, MALVACEÆ, are two species so nearly allied botanically, that from an economic point

of view they may be regarded as one and the same. The former is characterised by having the upper surface of the leaf rugose, the under velvety, with the carpels scarcely longer than the calyx. The latter, by the leaves being covered on both surfaces with closely-felted white down, the carpels being also longer than the calyx.

Abutilon asiaticum, *G. Don; Fl. Br. Ind., I., 326.* 80

COUNTRY MALLOW.

Syn.—SIDA ASIATICA, *Linn.*, belongs to the former species.

Vern.—*Kangahi,* or *kanghi, jhampi,* HIND.; *Petári,* BENG.; *Kangori, chakra-bhenda, Petári,* MAR.; *Tutti* (or *tuthi nar*), *perun-tutti,* TAM.; *Tuttura-benda, nugu-benda chettu,* TEL.

A. asiaticum, *G. Don,* is chiefly met with in Western India and Ceylon, while **A. indicum,** *G. Don,* is widely distributed throughout tropical India, to Prome, Pegu, and Ava (wanting in Malacca). They are annual or perennial bushes, frequenting roadsides, banks of rivers, &c., especially in the vicinity of villages. Their curious fruit, consisting of a whorl of pretty carpels, has apparently suggested many of the designs in jewellery made in Eastern India. They blossom and seed all the year, and when not insect-eaten, their graceful velvety leaves contrast elegantly with their yellow flowers.

Fibre.—The stems contain a good fibre, suitable for cordage. (See remarks under **A. Avicennæ.**) These exceedingly abundant wild plants deserve attention as paper-yielding fibres. FIBRE Stems. 81

For further particulars see **A. indicum.**

Abutilon Avicennæ, *Gærtn.; Fl. Br. Ind., I., 327.* 82

INDIAN MALLOW; AMERICAN JUTE.

Syn.—SIDA ABUTILON, *Willd. in Roxb. Fl.*

References.—*Roxb., Fl. Ind., Ed. C.B.C., 518; Voigt's Hort. Sub. Calc., 114; Christy, New Comm. Pl., 33-34.*

Habitat.—A native of North-West India, Sind, Kashmír, and distributed to North Asia and westward to South Europe and North America. It is said to be also met with in Bengal, but **Roxburgh** first reared it from seeds received from China under the name of *King-ma.* In Bengal it would therefore seem to be introduced or met with in cultivation only.

Botanic Diagnosis.—*Leaves* orbicular, cordate, with a long point. *Peduncles* solitary, axillary shorter than the *petiole. Sepals* free or nearly so. *Petals* yellow, hardly exceeding the sepals. *Carpels* 15-20, becoming ultimately divergent, and much exceeding the sepals.

Properties and Uses—

Fibre.—Considerable attention has of late years been directed to the fibre produced from this species; in the United States vast quantities are being prepared over the region from Ohio to Missouri. "It is pronounced superior to Indian jute and finer than Manilla hemp. It takes readily any colour, and its natural lustre displays more in the aniline dye than in any other—a great advantage over Indian jute, which is antagonistic to cheap bleaching and dyeing." "It is stated that an acre of ground will produce 5 tons of **Abutilon** stalks, and about 20 per cent. of pure fibre is obtained after preparation. Considered superior to jute fibre as imported; the long fibre is fully equal in value to Calcutta prime jute, and Philadelphia rope-manufacturers have already offered to buy any quantity at the highest market price for jute." (*Christy.*) This is exceedingly important, and points to the advisability of a thorough examination of this and other Indian species with special reference to their fibres. It is recom- FIBRE. Stems. 83

mended to be sown broadcast, the yield from good soil being 4 tons an acre of dry stalks.

84 **Abutilon graveolens,** *W. & A.; Fl. Br. Ind., I., 327.*

Syn.—SIDA GRAVEOLENS, *Roxb.;* SIDA HIRTA, *Lam., DC. Prod.*

Vern.—*Barkanghi,* HIND. and BENG.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 518.*

Habitat.—North-West Provinces, Sindh, Nilgiri Hills, and Ceylon; distributed to Beluchistan, Java, tropical Africa, and Australia.

Botanic Diagnosis.—Whole plant covered with clammy pubescence and spreading hairs. *Leaves* orbicular, cordate, acuminate. *Peduncles* as long as the petioles. *Carpels* 20 or more, rounded and hairy, not awned. The whole plant has an unpleasant smell.

Properties and Uses—

FIBRE. Stems. 85 MEDICINE. Leaves. 86 Roots. 87 Seeds. 88

This is chiefly a native of the North-West Provinces and Sind, extending along the western side of India to the Nilgiri Hills and Ceylon. **Kurz** says it is also met with in Pegu, frequenting uncultivated places. This species was first obtained by **Dr. Roxburgh** from seeds sent him from Cawnpore. From its prevalence in the North-West Provinces, and the fact that it contains a much larger proportion of mucilage than any of the preceding species, this is most probably the plant which yields the *Kangai* medicine used in these Provinces. It may be employed for the same purposes as the preceding, the stems yielding fibre, the leaves, roots, and seeds medicine.

89 **A. indicum,** *G. Don; Fl. Br. Ind., I., 326.; Wight, Ic., t. 12.*

Syn.—A. ASIATICUM, *W. & A.,* non SIDA ASIATICA, *Linn.;* SIDA INDICA, *Linn.;* SIDA POPULIFOLIA, *Lam.;* SIDA BELVERE, *L'Her.*

Vern.—*Kanghi, kanghani, jhampi,* HIND.; *Potári,* BENG.; *Miru baha,* SANTAL, *Masht-ul-ghoul, deishar,* ARAB.; *Darakhte-shanah,* PERS.; *etári, Pmadni, Kangori, kangoi, chakra-bhenda,* BOMB. and DUK.; *Dábali,* GUJ.; *Balbij,* CUTCH; *Khápato,* SIND; *Petári, túp-kadi,* GOA; *Tutta, uram,* MALAY; *Shrimudrigida,* KAN.; *Tutti, perun-tutti,* TAM.; *Tuttura-benda, nugu-benda, tutiri-chettu,* TEL.; *Anoda-gaha,* SINGH.; *Bon-kho-e, bon-khoye, tha-ma-chók,* BURM. The seeds are known as *balbij,* BOMB.

References.—*Drury's U. P., 4; Roxb., Fl. Ind., Ed. C.B.C., 518; Atkinson's N.-W. P. Gaz., X., 724-791; Stewart's Pb. Pl., p. 21; Dalz. and Gib.'s Bomb. Fl., 18.*

Habitat.—A small shrub, common throughout the hotter parts of India.

Botanic Diagnosis.—*Leaves* cordate, entire or toothed, closely felted with white down on both surfaces. *Sepals* ovate, acute. *Carpels* 15-20, when ripe longer than the calyx, glabrescent, truncate, or shortly awned, awns spreading. *Flowers* yellow, opening in the evening. *Peduncles* longer than the petioles, joined near the top.

Properties and Uses—

FIBRE. Stems. 90 **Fibre.**—The STEMS contain a good fibre, suitable for cordage. (See remarks under **A. Avicennæ.**)

MEDICINE. Leaves. 91 **Medicine.**—The LEAVES yield a mucilaginous extract, used as a demulcent.

Root. 92 From the ROOTS an infusion is prepared and given in fevers as a cooling remedy; said also to be useful in the treatment of leprosy.

Seeds. 93 The SEEDS are considered laxative and demulcent, and are given in the treatment of coughs. They are generally known by the name of *Balbij,* especially in Western India; they cost about R6 per maund. The bark is astringent and valuable as a diuretic. The bark, roots,

MEDICINE.

leaves, and seeds are used in native medicine, and said to be useful in chest affections. An infusion of the leaves or of the roots is prescribed in fevers as a cooling medicine (*Ainslie*). The seeds are used as a laxative in piles. In Bombay, they are supposed to be laxative and demulcent, and, like the leaves, are very mucilaginous. **A. indicum** and **A. asiaticum** are used indiscriminately, if not also one or two other species. A decoction of the bark, leaves, and seeds together has been long used by the Hindús on account of its mucilaginous and diuretic properties, much in the same way as the Marsh-mallow of Europe. (*Dymock, Mat. Med., Western India.*)

"§ A decoction is used as a mouth-wash in cases of toothache and tender gums. Boiled milk, whisked with the fibrous twigs, coagulates; the fluid obtained on decantation is by hakims regarded as efficacious in hæmorrhoids when given internally." (*Surgeon G. A. Emerson, Calcutta.*) 94

"The seeds are reckoned aphrodisiac. The leaves are cooked and eaten in cases of bleeding piles. The infusion of root is useful in strangury and hæmaturia." (*Surgeon-Major D. R. Thompson, M.D., C.I.E., Madras.*) "Dose, half to 2 drachms, laxative and demulcent, invariably used in combination with other purgative medicines." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "A decoction of the leaves is used in gonorrhœa and chronic bronchitis." (*J. Norman, Chatrapore, Ganjam.*) "A mucilaginous decoction used in gonorrhœa and inflammation of the bladder." (*Surgeon J. Anderson, Bijnor.*) "The seeds are burned on charcoal and the recta of children affected with thread-worm are exposed to the smoke. It is said to be a very rapid and certain cure, but I have never tried it myself." (*Surgeon-Major C. W. Calthrop, Morar.*) 95

Abutilon muticum, *G. Don; Fl. Br. Ind., I., 327.* 96

Syn.—Sida tomentosa, *Roxb., Fl. Ind., Ed. C.B.C., 518; Dalz. & Gib.'s Bomb. Fl., 18.*

Habitat.—An erect annual, native of rubbish heaps, road-sides, hedges, &c., where the soil is good; met with in the North-West Provinces and Western Peninsula.

FIBRE. Bark.

Fibre.—Yields a fibre. 97

A. polyandrum, *Schlecht; Fl. Br. Ind., I., 325; Atkinson, Gaz., N.-W. P., X., 791; Dalz. and Gibs., Bomb. Fl., 17.* 98

Syn.—Sida polyandra, *Roxb.; Fl. Ind., Ed. C.B.C., 516.*

Vern.—*Velai-thuthi*, Tam.?

Habitat.—A native of the North-West Provinces, tropical Himálayas, up to altitude 3,000 to 4,000 feet, Western Peninsula, Nilgiris, and Ceylon.

FIBRE. Bark.

Fibre.—It yields a long, silky fibre, resembling hemp. 99

ACACIA, *Willd.; Gen. Pl., I., 594.* 100

A genus of spiny or prickly shrubs or trees belonging to the Natural Order Leguminosæ and constituting the most characteristic group of the Sub-Order Mimoseæ. It comprises in all some 430 species, of which the foliiferous are cosmopolitan to the tropics, and the phyllodineous (comprising two thirds of the genus) almost restricted to Australia. The genus is characterised by having small *flowers* aggregated into rounded or elongated heads. Each flower or rather *floret* has its *calyx* and *corolla* regular and valvate. The *stamens* are indefinite and free.

In India there are 18 species, chiefly distributed throughout the plains, two species ascending the hills to altitude 5,000 feet. The following are those of economic interest.

ACACIA arabica.

Indian Gum Arabic.

101 **Acacia arabica,** *Willd.; Fl. Br. Ind., II., 293,* LEGUMINOSÆ.

INDIAN GUM ARABIC TREE.

Syn.—MIMOSA ARABICA, *Lamk.;* ACACIA VERA, *Willd.;* A. NILOTICA, *Desf.*

Vern.—*Babúl, babur, bábla, kikar,* HIND., BENG., PB.; *Vabbúla, barbara,* SANS. (*Dr. Rice says these are doubtfully Sanskrit words or only Sanskritised*); *Ummughilán,* ARAB.; *Kháré-mughilán,* PERS.; *Karúvelum, karú-veylam, kar-vaila* (by Cleghorn), TAM.; *Túma, nella túma, nallatumma kara* (by Cleghorn), TEL.; *Gobli, karrijáli,* MYSORE; *Jáli,* KAN.; *Bábhula, káli-kikar, ráma-káti,* BOMB.; *Bával,* GUJ.; *Babbar, babhúla, kálikikar,* SIND; *Bábúl,* C. P.; *Gabur,* SANTAL; *Babola,* MAL. (S. P.); *Hnan-lón-kvaing?* BURM. (*contributed by A. M. Buchanan*); *Sant,* AFRICA. IN KANARESE, *mara* (tree), *chukke* (bark), *chipo* (leaves), are often given as port-fire; *Jáli-mara*=Jáli-tree.

References.—*Voigt, Hort. Sub. Calc., 262; Stewart, Pb. Pl., 50; Brandis, For. Fl., 180; Drury, U. Pl., 4; Gamble, Man. Timb., 151; Flück. & Hanb., Pharmacog., 1879, 233; Bent. & Trim., Med. Plants, II, 94; U. S. Dispens., 15th Ed., 11; Year Book, Pharm., 1873, 52; 1874, 280; 1881, 191; and 1882, 152; Atkinson, Him. Distts. (X., N.-W. P. Gaz.), 781; Gums and Resins, p. 7; Baden Powell, Pb. Prod., I., 345, 364, and 471.*

Habitat.—Panjáb to Behar, Western Peninsula, and Ceylon. Cultivated throughout the greater part of India save in the moist humid regions on the coast and in the extreme north-west beyond the Jhelum. One of the commonest plants of the Deccan, but, except where planted, it is rare in the Panch Maháls; it covers most parts of Surat and Gujarát. Is common in the Upper Godaveri, and is the most abundant plant of the Shewan district, Sind. An experiment to introduce the tree into Kashmír failed. It is also absent from Assam and the greater part of the warm moist districts of Eastern Bengal, British Burma, and Mánipur. It becomes smaller in stature on approaching the coast, attaining its greatest prevalence and most prolific condition in lower and middle Sind. It is not indigenous to the Panjáb, although plentiful, attaining a girth of 5 or 6 feet in the submontane districts; nor is it indigenous to Madras, although it grows plentifully near villages and on waste lands, especially on black cotton soil. Very common in East and South Mysore. It prefers a dry to a moist soil, and seems to avoid the influence of the sea. The tree is never leafless, but the fresh foliage appears in February to April. (*Brandis; Stewart.*)

Botanic Diagnosis.—An erect shrub or tree, with straight spines. *Leaves* composed of from 6-12 pinnæ and 20 to 40 leaflets. *Flowers* in rounded heads, axillary; supported upon short *peduncles* with the *bracts* above the middle. *Pod* stalked, straight, sub-indehiscent, persistently grey-downy, with sutures deeply indented between the seeds; seeds 8-12.

This species belongs to the series **Gummiferæ globiferæ** or arborescent Acacias with globular, axillary flower-heads, and straight long spines. This series contains the following species:—

A. arabica, A. eburnea, A. Farnesiana, A. Jacquemontii, A. leucophlœa, and **A. planifrons,** which compare.

For series **Gummiferæ spicatæ** see **A. Catechu,** and for series **Vulgares** see **A. concinna.**

Properties and Uses—

SYNOPSIS OF PRODUCTS AND ECONOMIC PARTS OF THE PLANT.

1. It yields a GUM, in India used by the calico-printer and for other industrial purposes; as a medicine by the natives, and to a certain extent as an indifferent substitute for true gum arabic. In times of scarcity it also constitutes an important article of food.

2. THE BARK is largely used by the Indian tanners in the preparation of leather, and also as a dye. It is a valuable astringent medicine, extensively used by the natives, and in Indian European medical practice as a substitute for oak bark. It is also used to flavour native spirits.

3. THE POD has recently attracted much attention as a tanning material, containing a high percentage of tannin, and imparting a good and uniform colour to the leather. From the immature pods, by expression and inspissation, an extract was formerly prepared. This was known to the ancients as *Acaciæ veræ succus*, and was highly prized by the Greek medicinal writers. From them the virtues of this Acacia extract passed doubtless to the Arabs, and, at the present day, a drug known as *akaka* or *akakia* (or *acacia*) is regularly imported into Bombay from Turkey and Persia, and kept by all Mahomedan druggists in India.

4. THE LEAVES are used as a tan and dye; they are often eaten; and constitute an important fodder in times of scarcity.

5. THE TIMBER is highly valued because of its hardness and durability. One of the principal trees in the Panjáb for the rearing of lac insects (see "Lac").

THE GUM.

GUM. Babul. 102

Vern.—*Babúl-ki-gónd, kikar* (or *kikar*) *ki-gónd*, HIND.; *Bábla-átá, babla-gónd, babúl-gónd*, BENG.; *Káli-kikar-ki-gónd*, DUK.; in TAM. *pishin*, and in TEL. and MAL. *pasha* are added to the respective vernacular terms for the tree to denote the gum. According to **Moodeen Sheriff**, *kála barbúra-niryásam* is the Sanskrit for this substance. *Samghul*, HINDI, ARAB. **Dr. Rice** writes that *kála barbúra niryásam* is only a modern attempt to render in Sanskrit. It means the juice of the black *barbúra*, whatever the latter may be.

Dr. Dymock says: "There appears to be no mention of Gum Arabic in Sanskrit works." The Arabic and Persian name *Samgh-i-Arabi* given to this gum is more correctly the name for the True Gum Arabic than for the Indian Gum Arabic, which is sometimes called *babúl-gónd*. Commercially the gum from **A. arabica** is known as Morocco or Brown Barbary Gum or Mogador Gum—*Gum Gattie* according to **Atkinson**. The name Indian Gum Arabic must be carefully distinguished from the commercial term East Indian Gum Arabic. Many authors use these incorrectly as synonymous.

This gum is a tolerable substitute for the True Gum Arabic, but the mucilage is weak, and the red colour often objectionable. It exudes chiefly in March and April, each tree yielding about 2 lbs. In the bazars it occurs in the form of irregular and broken tears, agglutinated in masses, each tear about half an inch in size, and of a brown or red to light straw colour.

For the chemical composition of Gum Arabic, see **A. Senegal**.

TRADE AND COMMERCE.

External.—The subject of the identification of the true Gum Arabic of Europe is one still involved in considerable obscurity. The term Gum Arabic is of course incorrect, little or no gum ever having come from Arabia. Several species of Acacia yield gums, belonging to the Arabic series, and these, mixed together or distinct from each other, but more or less adulterated with foreign matter, reach Europe, and are by the dealers classed into geographical varieties, to which, according to their purity, are attributed certain commercial values. The principal English supply is from Egypt; France obtaining its gum from Senegal. The so-called East Indian gum, which is exported from Bombay to England, to the continent of Europe, and to America, is first imported into Bombay from the Red Sea ports. Except as adulterating this so-called East Indian gum, it is doubtful if

ACACIA arabica.

Manufacture and preparation of the Babúl.

GUM.

any Arabic gum of Indian origin ever finds its way to Europe. The impurities of the East Indian gum are said to be chiefly a substance resembling Bassora (readily distinguished by its insolubility in water), and a resinous substance belonging to the turpentine series. It would seem that the subject of our Arabic gums has not hitherto obtained the attention which it deserves. The various species of **Acacia**, wild or under cultivation, should be critically examined and their respective gums carefully collected; the area under each, and the present and prospective supply of gum, accurately recorded. It would, of course, be of little importance to attempt to calculate the probable number of trees scattered here and there over the country near villages—the forest tracts or areas where gum-yielding trees form the prevailing feature are those of importance. Were this to be done, and a report published and forwarded to Europe along with a complete set of samples, a future trade would, for certain, develop,—a trade which would soon check the anomalous importation of African gum, and become a new source of revenue to India and her people. When it is recollected that all the Egyptian and African species which yield the true Gum Arabic of European commerce are either wild in India or are extensively cultivated or naturalised, it is remarkable that no effort should have been made on the part of India to compete with Egypt and Africa. The commercial gums known as MOROCCO, MOGADOR, or BROWN BARBARY gums are derived from **A. arabica**, *Willd.* They are described as consisting of tears or broken pieces of a light dusky-brown tint. When dry they are permeated by cracks and are very brittle. They are perfectly soluble in water. (For further information consult **A. Catechu** and True Gum Arabic under **A. Senegal**.)

Internal.—While our Indian gums are little if at all exported to Europe, *babúl-gónd* constitutes an important article of internal trade. But even in this trade there is a great deal of uncertainty, which a little careful investigation might easily enough remove. It seems probable that the finer qualities of *babúl-gónd* sold in our bazars may prove to be Senegal gum or white sennar (the true commercial Gum Arabic), the confusion in calling *babúl gum* Gum Arabic having arisen in all probability from the fact of the scientific name **Acacia arabica** having been given to this species. The *babúl-gónd* or *kikar-gónd* of the bazars is rarely pure, being mixed with mechanical impurities, and adulterated with other gums. The following are the gums generally mixed with each other and sold as *babúl-gónd*: the true Gum Arabic obtained in Sind from **A. Senegal** (the *khor*, SIND, or *kumta*, RAJPUTANA), **A. Catechu** gum (the *khair*), **A. Farnesiana** (the Cassie or *Vilayati-babúl*), **A. lenticularis** (*khair*), **A. modesta**, (*phuláhi*), and several gums obtained from various species of **Albizzia.**

MANUFACTURES AND PREPARATIONS.

Babúl-gónd is extensively used by the calico-printers. For certain colours a mixture of this gum, with that obtained from **Anogeissus latifolia**, the *dhawa*, is regarded as most serviceable, and this mixture is likewise used to stiffen dyed fabrics and to give them a polish. It is also said to be used extensively in precipitating the indigo fecula. With turmeric (*huldí*) dye the *Dhawa-gónd* is used alone, while with madder the *babúl-gónd* is regarded as most efficacious.

(For the "medicinal" uses and properties of this gum and for its value as an article of "food," see the remarks under those sections.)

THE TAN.

TAN. Bark. 103 THE BARK (*babúl-ki-chhál*, HIND., or *kas* or *sák* in N.-W. P.) is a powerful astringent, and is one of the tanning substances most extensively used in India. There seems no reason why this might not

The Babúl—A Tan of much value.

ACACIA arabica.

TAN.

compete with the Australian wattle-bark if once made properly known; its cheapness, as compared with the wattle, would more than compensate for a slight inferiority in quality.

It is obtained by felling the trees 8-10 years old, and cutting them up into pieces 2¼ by 3 feet in length, the bark being removed when green. To do this the logs are beaten until the bark is removable, the wood being sold as fuel. The bark in appearance consists of reddish-brown slabs, hard and rough, with longitudinal fissures, the inner surface being smooth and fibrous. Recent experiments made by **Mr. W. Evans**, one of the best practical authorities upon tanning, in his laboratory at Taunton, have shown this bark to contain 18·95 per cent. of a beautiful cream-coloured tannin, when precipitated with gelatin. There is at present no exportation of *babúl* bark to speak of, but there seems every chance of a future trade developing. **Mr. Christy**, in his *New Commercial Plants*, suggests that the bark, pods, and twigs should be used in the preparation of a tanning extract which apparently he recommends should be prepared in India, and in that condition, instead of as bark, the *babúl* tan should be exported. In a correspondence with the Provincial Agricultural Departments the Government of India obtained much new information regarding the prospects of a future trade in this bark. In that correspondence **Mr. J. S. Gamble**, Conservator of Forests, Northern Division, Madras, suggested that if grown for its bark, **Acacia arabica** "would probably be found most profitable," if treated "in coppice and cut over every 8 to 10 years." "It would therefore require to be planted close, say, 10′ × 10′, or, still better, propagated by broadcast sowing": "the wood could, at the time of cutting, be also easily sold at good rates in any locality away from the large forests where *babúl* is grown."

Pods. 104

THE PODS (*babúl-séngrí*) are also used as a tan, imparting a buff colour to the leather. If it is desired to cultivate the tree on account of its pods, **Mr. Gamble** recommends that it should be planted at first 15 feet apart and thinned out to 30 feet. A proper amount of air and sunlight is essentially necessary for the full development of the fruit. This would give about 48 trees an acre.

An enquiry has recently been received by the Revenue and Agricultural Department of the Government of India from the Berlin Leather Trades Association, through Messrs. Fischer & Co., of Bombay, regarding what appears to be the *babúl* pods. The Association writes that a small pod known under the nam eof *blablab* (? *bábld*, the Bengali for **Acacia arabica**) formerly imported from the East Indies and partly also from the African coast, has of late years entirely dropped out of the market. On being boiled it gave a dull decoction of a light grey-yellowish colour. This colour became evenly diffused, and was specially serviceable for sheep-skin. "It is earnestly desired to recover again this tan and dye-stuff." I have taken the liberty to publish the substance of this correspondence, since by doing so this may lead to the resuscitation desired. There seems little doubt that the so-called *blablab* referred to by the Berlin Leather Trades Association is the pods of the common *babúl*. It is chiefly as a leather dye-stuff that the Berlin Association wishes to recover the pods. Speaking of these pods **Mr. Christy**, in a letter to the *Tropical Agriculturist, Vol. 2, p. 989*, states that they had been submitted to a chemical examination and were found to contain 60 per cent. of tannin. The seeds are worthless and should be rejected. He also adds that by means of this tanning agent a beautiful light-coloured leather was produced. Valonia yields only 25·2 per cent. of tannin and sells for £18 per ton. When once the *babúl* pods come into the market as a recognised tan, **Mr. Christy** anticipates they will fetch £40 a ton. If this statement be correct it is remarkable that a large trade

TAN. should not already exist in *babúl* pods, and still more so that such a trade apparently did exist but has now died out. **Mr. Buck**, in his *Dyes and Tans of the North-West Provinces,* says: "The babúl pods are used for tanning in the villages of the Cawnpore district, and when nothing better is obtainable the leaves are employed as a make shift." But of the bark he says "it is the commonest and most effective tanning agent" used in these Provinces.

Leaves. 105 THE LEAVES alone are, in some parts of the country, used as a tan, but chiefly as a substitute for the bark. By the native tanners in India the bark is regarded as a much more powerful tan than the pods—a fact somewhat at variance with **Mr. Christy's** anticipations.

THE DYE.

DYE. Pods. 106 As a dye-stuff the boiled pods are often used, especially in the North-West Provinces, constituting the black colour known as *siyah-bhura;* this, with a subsequent application of a solution of sulphate of iron, changes the black into shades of grey ranging to dark brown, giving origin to the colour known as *Agrai-khaki.* Both colours are fast: but the iron is most objectionable. In combination with the barks of **Acacia Catechu** and **Butea frondosa** rich brown colours are also produced. The pods and bark, with alum as the mordant, yield dark brown shades approaching to black. In Upper India the pods are largely used by the dyers both as a direct source of colour and as an accelerator to other dyes. In addition to the local supply, which, in the warm, dry regions of the central and northern tracts of India, is very considerable, large quantities are brought from the forests, Kumaon alone sending some 30 cwts., valued at R400. The price in Calcutta of the dried pods is from 2 to 3 annas a ℔.

§ "The bark furnishes a dye largely used by the natives." (*Surgeon S. H. Browne, M.D., Hoshangabad, Central Provinces.*)

THE FIBRE.

FIBRE. Bark. 107 THE BARK of the slender twigs yields a fibre, which is used in the Panjáb for the manufacture of paper. It is also made into coarse ropes.

MEDICINAL PRODUCTS.

MEDICINE. Gum. 108 The true Gum Acacia is used in the preparation of the mucilage; the *Pharm. Ind.* says that the gum of **Feronia Elephantum,** *Corr.,* is a better substitute for this than the gum from **A. arabica.** Gum is used as a demulcent, and along with water as a vehicle for bismuth, oxide of zinc, or other insoluble substance and also in lozenges.

109 § "I do not agree with this remark; the gum of **Feronia Elephantum,** is much inferior in various respects to that of **A. arabica.**" (*Deputy Surgeon-General G. Bidie, M.B, C.I.E., Madras.*) "Gum Acacia is also administered to recently-delivered women as a tonic." (*Surgeon H. McCalman, M.D., Bombay.*) "The gum is largely used in the form of a mucilage in diarrhœa and dysentery." (*Bhagwan Das, Rawal Pindi.*) "Some native hakims say the gum is very useful in diabetes mellitus, as the gum is not converted into sugar. The bark and seeds burnt and powdered are used as a tooth-powder." (*Surgeon Emerson, Calcutta.*) "The powdered gum is useful, combined with quinine, in fever cases complicated with diarrhœa and dysentery." (*Brigade Surgeon Shircore, Moorshedabad.*) "The mucilage in its simple form used as an injection has been found to allay the irritation of gonorrhœa, and to lessen the discharge. It has also been found to allay rectal irritation in the diarrhœa and dysentery of children, when given as an injection." (*Peter Anderson, Guntur, Madras Presidency.*)

"**Acacia arabica** mucilage I have used in cases of cystitis with good effect." (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*) "An infusion

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or decoction of the bark is used as gargle for sore-throat and stomatitis. The juice of the tender leaves is dropped into the eye for epithora and conjunctivitis. The gum is fried in *ghí* and made into sweetmeat for the use of women in childbed." (*Surgeon-Major J. Robb, Ahmedabad.*) 110

"Decoction of bark useful in chronic dysentery and diarrhœa as an astringent enemata. Useful gargle in spongy, bleeding gums and mercurial salivation. Excellent mucilage from gum used in gastro-intestinal irritation." (*Surgeon Shib Chunder Bhattacharji, Chanda, Centl. Prov.*)

Bark.

THE BARK is a powerful astringent; recommended to be made officinal. It occurs in coarse, fibrous pieces of a deep reddish colour. It may be used in external applications as a substitute for oak-galls. It has been found a valuable remedy in prolapsus ani, as an external applicant in leucorrhœa, and has been recommended as a poultice for ulcers attended with sanious discharge. (*Pharm. Ind.*) As a substitute for oak-bark, *babúl* is now issued to the Government hospitals and dispensaries in India. I am informed that the powdered dry bark dusted over sores or ulcers on the lips of horses is one of the best cures for these troublesome affections. A similar powder is used in the Panjáb in the treatment of snake-bite. 111

§ "I have frequently used the decoction of Babla bark as a substitute for oak-bark for vaginal injections. It might take the place of imported oak-bark." (*Surgeon C.H. Joubert, Darjíling.*)

"In addition to the ordinary uses of the gum and the bark, I have frequently used the decoction of the bark as an astringent injection in different forms of leucorrhœa and found it to be more efficacious and less irritating than the alum and zinc injection generally used." (*Doyal Chunder Shome.*) "Useful as a gargle in relaxed sore-throat." (*Surgeon J. Anderson, Bijnor.*) "The infusion is useful as an injection in whites." (*Surgeon-Major G. Y. Hunter, Karachi.*) 112

"Babúl Bark } Mango ,, }	$1\frac{1}{2}$ oz. each.
Water	20 oz.

Boil for half an hour, filter, and make a gargle: said to be used in mercurial salivation." (*Surgeon J. Parker, M.D., Poona.*) "A decoction of the bark is used by women in menorrhagia and leucorrhœa, and is said to be efficient. The decoction is also used in caries of the teeth as a mouth-wash. The young leaves in doses of 2 drachms are used in gonorrhœa with good effect." (*Narain Misser, Hoshangabad, Central Provinces.*)

"The bark of the **Acacia arabica**, combined with the bark of the Banyan tree (**Ficus bengalensis**), after being infused, has been frequently used by me as a gargle in relaxed sore-throat with excellent effect. Strong infusion of the above barks has also been used locally in cases of excessive bleeding from hœmorrhoids with very good effect. The dissolved gum with bismuth is very effectual in checking diarrhœa arising from intestinal irritation." (*Honorary Surgeon Easton Alfred Morris, Negapatam.*) 113

Pods

THE DRIED PODS reduced to a powder are sometimes given internally as an astringent.

§ "The powder of the tender legumes of **A. arabica** is astringent and demulcent, and has a beneficial influence over diarrhœa and dysentery. Its usefulness is much enhanced by the combination of some preparation of opium. It is generally more useful for children than adults." (*Honorary Surgeon Moodeen Sheriff, Khan Bahadur, Madras.*) 114

The extract Akakia

AN EXTRACT prepared from the young pods of this and allied species constituted the famous *Akakia* of the ancient Greeks. This extract was at one time much extolled, and its virtues were doubtless ultimately made 115

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The Babúl—Opinions of Medical Officers.

MEDICINE.

known to India through the Arabs. At the present day it is largely imported into India from Turkey and Persia, and under the name *akaka* or *akakia* or *akhákhíyá* (acacia) is sold by all Mahomedan druggists. According to **Dymock** "it should be heavy, hard, and have an agreeable odour; small fragments held between the eye and the light should be of a bottle-green colour; when seen in bulk it appears black. It is considered to be cold and dry, astringent, styptic, and tonic, and is used internally and externally in relaxed conditions of the mucous membranes; also as a collyrium in purulent conjunctivitis and chronic congestion of the vessels of the conjunctiva. Applied as a lotion, it is said to improve the complexion. With the white of an egg it is applied to burns and scalds. Powdered it arrests hæmorrhage; in short, it is used in all cases in which an astringent is applicable."

Decoction from Bark. 116 A DECOCTION of the bark mixed with milk, according to **Mr. Baden Powell** (*Panjáb Products, Vol. I, p. 345*), is in Delhi and Lahore evaporated into the *akakia* juice. The term *akakia* is apparently incorrectly applied to this decoction, but the preparation is nevertheless an interesting adaptation of the ancient *akakia* or *akhákhíyá.* It is said to be made into dark flat cakes with a sweet astringent taste. It is regarded as acting as a demulcent and astringent, and is said to be prescribed in coughs. There is probably some mistake regarding the source of these cakes. It is difficult to see how they could be sweet if prepared from the bark, unless sweetened through some action upon the milk.

117 §" I have often used the decoction of the bark as an injection in chronic dysentery with relaxed state of the rectum, when, with tolerably healthy motions, a little mucus is passed. The injection reduces the quantity of the mucus, soothes the irritability, and gives tone to the mucous membrane. I have also used the decoction in acute congestion of throat with success." (*Surgeon D. Basu, Furridpur.*) "The bark contains a large quantity of tannin; a decoction of it, as a local application, is most useful in cases of prolapsus uteri and of prolapsus ani, and in other uterine and vaginal affections of an asthenic nature." (*Brigade Surgeon S. M. Shircore, Moorshedabad.*) "The decoction of the bark is used as an astringent in diarrhœa and dysentery, also as an injection in gleet and leucorrhœa, and as a wash for hæmorrhagic ulcers, also as a gargle in affections of the mouth and throat. The tender leaves are sometimes used in dysentery as well as in diarrhœa." (*Brigade Surgeon J. H. Thornton, B.A., M.B., Monghyr.*) "A decoction of the bark is used as an astringent gargle in ulcers of the mouth. The tender growing tops rubbed into a paste with a little sugar and water is given morning and evening as a demulcent to allay irritation in acute gonorrhœa." (*Surgeon-Major Bankabehari Gupta, Púri.*)

Leaves. 118 THE TENDER LEAVES beaten into a pulp are given in diarrhœa as an astringent (*U. C. Dutt*). Mixed with the leaves of the pomegranate this pulp is also given in gonorrhœa.

119 § "The young leaves are beaten up with black pepper and sugar, and given in hæmatemsis." (*Surgeon-Major C. W. Calthrop, M.D., Morar.*) "The powdered gum is lightly fried in *ghí* and used as an aphrodisiac. The tender leaves, fried in *ghí,* are used as a poultice over the eyelid to remove chronic congestion of the conjunctiva. The bark is said to possess antisyphilitic properties." (*Surgeon-Major D. R. Thompson, M.D., C.I.E., Madras.*) "The tender leaves, bruised and mixed with human milk, is used in conjunctivitis as a poultice, or the juice mixed with milk is dropped into the eye. The burnt bark mixed with salt and burnt almond shell is used as a tooth-powder in Southern India." (*Surgeon-Major John Lancaster, M.B., Chittore.*)

FOOD.

The gum is highly nutritious, and to a limited extent forms an article of food, largely so in times of scarcity; in fact, there are few trees more valuable to the cultivator than the babúl. **FOOD. Gum. 120** It yields his most valuable timber while luxuriating on the poorest waste lands, and even in seasons of drought it is evergreen. Its bark forms a useful domestic medicine, and along with the leaves and pods it is also used in dyeing and tanning. **Bark. 121** The leaves are a never-failing source of fodder, and the gum an article of food; each tree yielding about 2 lbs. In times of scarcity even the ground bark mixed with the seeds of the **Sesamum orientale** may be used for food.

FODDER.

The green pods with tender shoots and leaves are given as fodder to cattle, sheep, goats, and camels; and are specially valuable for this purpose during a season of drought when other fodder fails. **FODDER. Pods. 122** In the drought of 1877-78 the road-side trees in the North-West Provinces were denuded of leaves for this purpose, and this resource saved numbers of cattle. In ordinary seasons goats are largely fed upon the pods; hence, in all probability, the rapidity with which the plant becomes diffused over the country, springing up self-sown on the banks of tanks, rubbish heaps, and walls. It is remarkable that sheep and goats not only eat but eat greedily a substance which is stated to contain so much of tannin. **Balfour** in his *Cyclopædia*, however, says it is only the seed that is given to sheep, but his statement is at variance with that of all other authors, the whole pod being given. **Seed. 123**

THE TIMBER.

Structure of the Wood.—Sapwood large, whitish; heartwood pinkish-white, turning reddish-brown on exposure, hard, mottled with dark streaks. **TIMBER. 124** It consists of darker and lighter coloured bands of an equal width. Weight about 54 lbs.

It is very durable if well seasoned. Used extensively for wheels, well-curbs, sugar and oil presses, rice-pounders, ploughshares, agricultural implements, and tool handles; in fact, for all purposes for which a bent hard wood is required. **Implements. 125** In Sind it is largely used for boat-building, rafters, and for fuel; also, occasionally, for railway sleepers. One of the most valuable timbers for tent-pegs.

The lighter-coloured sapwood of this tree is subject to be attacked by white-ants, the heartwood much less so if properly seasoned. A good tree will sell in the Panjáb for as much as R30 or more: one of the best trees for broad-cast sowings in the reclamation of waste lands, because independent of rain. It is said that seasoned wood will only float for a few days. The Sind and the Madras Railway Companies refuse to use babúl as a fuel from an idea that the pyroligneous acid injures the boilers. **Fuel. 126** It is, however, largely used for this purpose by railways in other parts of India.

DOMESTIC USES.

The bark of the roots is used to flavour native spirits and to assist the fermentation of the sugar. **DOMESTIC. Spirits. 127** The bark is also stated to be used as a substitute for soap. **Bark. 128** The green pods are made into ink. **Pods. 129** The young thorny twigs are universally used for temporary dry fences to protect certain crops, **Dry Hedges. 130** and large bundles of the boughs are used by the fishermen as decoys. In the rivers of Assam these decoys end in cone-shaped baskets placed on the margins of the streams sloping down water. Every now and then they are raised from the water, and the fish, unable to escape through the decoy in time, are caught in the basket or amongst the

Fish Decoys. 131 **Fishing-hooks.** 132 **Tooth-brushes.** 133

thorny twigs. In the tanks and lakes of Bengal similar decoys are submerged, and alongside of these, or imbedded between passages in the decoy, traps of various forms are placed. The sharp spines are made into the common fishing-hook used in Bengal. A portion of the twig is removed along with the spine, the string being tied to the hook so that the spine points upwards. Young fresh twigs are in Bengal used as tooth-brushes.

§ "The bark is extensively used in the preparation of country liquor." (*Bhagwan Das, Rawal Pindi.*)

134 "The bark is largely used for the distillation of rum. Before distillation takes place it is steeped in water with molasses for a few days. For loose teeth and tender gums, the young stems are used largely by the natives for rinsing the teeth daily." (*Assistant Surgeon J. N. Dey, Jeypore.*)

CULTIVATION AND RE-AFFORESTATION.

Improvement of waste lands.

The extended cultivation of this species and of the allied gum-yielding Acacias cannot but be attended with the most beneficial results to the country. As an agent to improve sterile tracts of country, or to arrest the destructive development of the efflorescence known as *reh*, the most sanguine expectations may be entertained. It should not be cultivated longer than has been found necessary to neutralise the salt, because *babúl* is an exhaustive crop. In fact, the moment *babúl* has taken a hold of the soil the improvement may be regarded as established, and should the soil be desired for other purposes the *babúl* should be early removed. There are extensive tracts of country highly suited for the cultivation of the gum Acacias, and tracts, too, where this crop would prove far more productive than the futile efforts which are now being spent upon them. The extended cultivation of the *babúl* as a hedge to protect the fields and roads would greatly help to avert the dangers of a season of temporary scarcity both to men and cattle. **Cleghorn** says "it is of rapid growth, and requires no water, flourishing in dry arid plains, and especially in black cotton soil, where other trees are rarely met with."

§ "One of the best subjects for planting in poor soils or exposed situations. During long periods of intense drought it continues to flourish." (*J. Cameron, Esq., Bangalore.*) "It is said that the seed collected from the litter of goats germinates more freely, and such seed is sometimes collected for sowings. If sown thick in a road, well, or ditch in the rains, it will, under favourable circumstances, come up as a wood-hedge. It is one of the most useful trees for broadcast sowings; the seed germinates so easily, and it is so hardy and independent of rain. In the drier districts it should be planted as a thick belt along all roads to form a roadside avenue. There would then be a vast supply of fodder available when rain failed. This is being attended to in this division." (*W. C. Coldstream, Esq., C.S., Hissar, Panjáb.*)

The seed is gathered in April, and by the native cultivator it is coated with cow-dung and kept in that condition until July, when it is sown at once into the spot where it is intended the tree should be allowed to grow. It requires no further care except to protect the young seedling from being browsed upon by animals. **Stewart** states that in the upper parts of the Gangetic Doáb it is raised by cuttings. **Major Pitcher,** Agricultural Secretary to the Chief Commissioner of Oudh, writes me that the best mode of propagating *babúl* is to fold sheep previously fed on *babúl* seed on the field where it is desired to plant the trees; or to carry the dung to the field and plough it in, when the plants will spring up like corn. He also informs me that **Dr. Bonavia** tried an experiment with a number of trees to discover which could withstand repeated swamping. All died except the *babúl*, which continues to flourish on the banks of the Gúmti, where

Cutch or Catechu.

RE-AFFORESTATION.

they are annually flooded. The *babúl* would, therefore, prove most useful upon embankments to break the force of water in storms or during floods. **Gamble** writes that it is an extremely useful tree in the re-afforestation of waste lands, being associated with **Albizzia Lebbek, Balanites ægyptiaca, Parkinsonia aculeata,** the tamarind, margosa, and wood-apple. These plants constitute the most prevalent association of trees met with in the warmer parts of India. The *bábul* is ready for barking in eight to ten years. It is then cut down and renewed by fresh seedlings, or the ground, after this season of repose and leaf-manuring, is brought under other forms of cultivation. A full-sized tree, eight to ten years old, will yield half a ton of bark. The gum-yielding property increases with age, the gum exuding naturally from the bark, or accelerated by artificial scars. **Stewart** mentions a tree at a Mussulman shrine close to Lahore said to be over 100 years old, which is popularly reputed to have shed blood when sacrilegiously cut by the Sikhs.

Acacia Catechu, *Willd.; Fl. Br. Ind., II., 295; Roxb., Cor. Pl., t. 175.* 135

This is the plant which yields—

CATECHU, CUTCH, CATECHU NIGRUM, PEGU CATECHU, *Eng.;* CACHORE, CACHOU, *Fr.;* KATECHU, *Germ.;* CATECU, CATEIN, CALTO, *It.;* CATECU, *Sp.;* CATCH, *Port.*

Sometimes called Terra Japonica, a name which more correctly means Gambier.

§ "Perhaps it would be better not to call this *the true catechu,* as the **C. pallidum** is now the officinal variety in British Pharmacy." (*Deputy-Surgeon General George Bidie, M.B., C.I.E., Madras.*) "The name **Catechu pallidum** has always been given to Gambier, and the word Catechu was originally applied to Cutch, which is officinal in America." (*G. W.*)

Syn.—MIMOSA CATECHUOIDES, *Roxb.;* ACACIA CATECHUOIDES, *Wall.;* A. POLYACANTHA, *Willd.;* A. SUNDRA, *Bedd.*

Vern.—*Khair,* or *khair-babúl, katha,* HIND., DUK.; *Khayer, kuth,* BENG.; *Khaiyar,* SANTAL; *Khoira, koir, kat,* ASS.; *Vódalam, vodalai, karangalli, bágá, wodalior, wodahalle* (by Cleghorn), (? *kasku katti*), *wothalay,* TAM. *Podala-manu, kaviri sandra, nalla sandra,* TEL.; *Khadira,* SANS.; *Khoiru,* URIYA; *Kagli, kagali, tare* (in MYSORE), KAN.; *Khaderi, khaira, khera,* BOMB., MAR.; *Kher,* SURAT, BARODA, GUJ.; *Khair,* C. P.; *Ratkihiri,* SINGH.; *Sha,* BURM.

"The khadira tree is mentioned in the Vedas, where it is used as a simile for 'strength,'" &c. (*Dr. Ch. Rice, New York.*)

References.—*Brandis, For. Fl., 186; Stewart, Pb. Pl., 52; Kurz, For. Fl. Burm., I., 422; Gamble, Man. Timb., 153; Roxb., Fl. Ind., Ed. C.B.C., 423; Madden, Jour. Asiat. Soc. Beng., vol. XVII., part I., p. 563; Royle's Ill., 182; Baden Powell, Pb. Prod., 345; Atkinson, Him. Dists., vol. X., N.-W. P. Gaz., p. 775; Balfour's Cycl., I.; Spons' Encycl.; Bombay Gazetteer, vols. IV., 24; VI., 13; X., 130; XI, 71, 72, 415; XII, 25; XIII, 160; British Burma Gaz., I, 128, 134, 415; C. P. Gaz., 118, 503; Oudh Gaz., vol. I., p. v.*

Habitat.—Common in most parts of India and Burma, extending in the Sub-Himálayan tract westward to the Indus and eastward to Sikkim, ascending to altitude 5,000 feet. **Mr. J. W. Oliver** reports that trees 70 to 80 feet high, with a girth of 8 to 9 feet, are not uncommon in the North Tharrawaddy Reserves. In Burma it grows in the dry forests all over the plains of Pegu; rare in the savannah forests; common in the northern part of the Irrawaddy (*Burm. Gaz., I., 128*). In the Central Provinces it is plentiful in the forests of Bilaspur, Chánda, and Raipur. It is remarkable that in Raipur the natives seem to be ignorant of its value, no attempt, as far as is known, having ever been made to extract the Catechu

ACACIA Catechu.

Catechu Gum.

(*C. P. Gaz.*, *419*). In Gonda, Oudh, it is abundant, also in the forests of the Upper Godaveri, spreading through the forests of Chutia Nagpur to the North-West Provinces. In the Bombay Presidency it is most abundant in the forests of Ahmedabad, Broach, the Panch Mahâls, Surat, and Baroda. In Madras the tree is by no means uncommon, but the natives appear to know nothing of its properties. It is also met with in some parts of Mysore, where it is even common.

Botanic Diagnosis.—A moderate-sized, deciduous tree, with dark brown, much-cracked bark, and short-hooked spines in pairs. *Leaves* composed of from 40 to 80 pinnæ and 60 to 100 leaflets. *Flowers* white or pale yellow, peduncled, spikes in the axils of leaves; *rachis* downy. *Corolla* 2 to 3 times the tomentose *calyx*. *Pod* straight, strap-shaped, narrow, thin, dark brown.

This belongs to the series **Gummiferæ spicatæ** or arborescent Acacias, with spiked flower-heads and short recurved spines (except **Latronum**):—

A. Catechu, A. ferruginea, A. Latronum, A. lenticularis, A. modesta, A. Senegal, A. Suma, and **A. Sundra,** which see and compare with above diagnostic characters.

For series **Vulgares** see **A. concinna.**

THE GUM.

GUM. 136 This plant yields a pale-yellow gum, often occurring in tears one inch in diameter, generally less than half an inch in size. It is sweet to the taste and soluble in water; it forms a strong mucilage, and is a better substitute for true gum arabic than babúl gum, with which it is generally mixed and sold as *babúl gónd*. The tears are mostly bright coloured, varying to dark amber. They occur chiefly in broken pieces, very much resembling large brown sugar, the fragments being cracked and granular.

A pure sample of *Khair gónd* was, in 1873 sent from Chânda in the Central Provinces to London for report and valuation. It was pronounced as ordinary gum arabic and valued at 20*s*. to 25*s*. a cwt. The Deputy Commissioner, in sending the sample, remarked that by a little care on the part of the merchant, a large supply of gum, equal in purity to the sample supplied, might easily enough be procured, and that the ordinary mixed gum arabic of Chânda sold for about R5-4 a cwt. landed in Bombay. The cost of collecting the gum in the forests was put down at R2-8 a maund (80 lb), carriage from forest to Bombay R1-4 a maund, and this gum might easily realise in London 20*s*., *i.e.*, twice what it cost landed at Bombay. In the Ahmedabad district and Gujarât this gum is largely collected, as also *bavál* gum, by the Bhils and sold either for grain or money or eaten by the poorer classes (*Bomb. Gaz., IV., 24*).

History of Catechu Gum.—No fresh effort appears to have been made to bring this gum to the notice of Europe, nor so to organise its collection that comparatively pure consignments might continuously find their way into the market. It is reported to be much superior to babúl gum, and it would seem a large trade might easily enough be established; confidence in the supply, however, must be created before any extended trade is possible. Indian gums hold so low a position, at present, in the commercial world, that they require to be freed from an undeserved stigma. To accomplish this the most likely course would be to collect authentic samples as types upon which, in Europe and in India, all experiments, reports, and administrative assistance or encouragement might be based. It must be borne in mind, however, that vernacular names of bazar products are most untrustworthy, far more so than the knowledge which every uneducated native of India possesses in the plants of his district. Adulteration and substitution is practised very largely in India; and in different districts, still more so in different provinces, widely dissimilar products are

Catechu Gum.

ACACIA Catechu.

GUM.

sold under the same vernacular names. The type samples require, therefore, to be collected from the individual plants and carefully examined both as to their physical appearance and chemical properties. So little is actually known regarding the subject of gums (even in Europe) that at present it is next to impossible to determine the botanical origin of a sample not accompanied with its geographical history, and even then a mere commercial approximation is all that can be arrived at. To remove this ignorance the greatest care is necessary, and it would be advisable to collect the type samples of each species of gum from one individual tree, and, if possible, say, during each of the great climatic seasons of the district—cold season, hot season, and during the rains. Such collections would enable questions of specific variation to be determined. It would also remove all doubt as to identity were a flowering twig of the tree to be dried and preserved so as to admit of botanical determination, together with a branch or log of the tree with gum exuding from it. The latter is necessary to afford some data by which the actual source or formation of each gum might be determined, for it is possible that the same tree may yield more than one gum.

Within the past few years the plants which yield the true commercial gum arabic have been pretty well determined, and it is important to note that all these are either wild or cultivated in India. To enable India to come into the field of competition with Egypt and Africa, the merits of the Indian gums must first be made known by some accurate and reliable mode such as has been indicated. When the gums obtained from Indian trees have been chemically and botanically examined and commercially tested, those most deserving of encouragement would be discovered, and we should be able to indicate to the merchant the provinces and districts where these were most easily and plentifully procurable. We should be able also to supply the merchant with the tests by which he could protect himself against adulteration and admixture. The possession of such a knowledge would, in time, check fraudulent action, and it would also act as the most powerful impulse to future progression, for, when freed of impurities, there does not seem any reason why a large trade should not be established in Indian gums. Nothing is so fatal to the development of such a trade, however, as adulteration and admixture, and it would seem that it is this that has prevented India from taking an important position as a gum-supplying country. **Dr. Cooke**, in his report on gums produced in India, says: "It is scarcely necessary to add that the gum must be unmixed. Two gums—it even may be that both are soluble—might not dissolve equally in rate or freely coalesce; this would be a disadvantage; but when two or more gums are mixed, of which one is insoluble in whole or in part, the whole sample is greatly deteriorated and reduced to almost the rate of the insoluble admixture. Hence then, commercially, it is of importance that gum should be (1) entirely derived from the same species of tree, (2) as light and uniform in colour as possible, and (3) free from all foreign admixture." In our Indian forests it frequently happens that two or more gum-yielding trees are found growing together, and the gums from these are indiscriminately collected together, the mixture being often reduced to a powder and sold in that condition with the object of preventing detection of the admixture and adulteration with sand or other non-gummy substances.

THE EXTRACT CATECHU OR CUTCH.

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Vern.—*Kat* or *Kath, katthá*, HIND.; *Kát*, MAR.; *Kátho*, GUZ.; *Káshukatta, káshu*, TAM.; *Kánchu*, TEL.; *Katti, káshi-katti*, MAL.; *Kachu*, KAN.; *Kaipu*, CINGH.

History of Catechu.—At the present day, by far the most important

ACACIA Catechu.

The Extract Catechu or Cutch.

CUTCH.

product of **Acacia Catechu** is the resinous extract (Catechu) obtained by boiling down a decoction obtained from chips of the heartwood. The practice of preparing this extract has been handed down from remote periods. The Sanskrit authors mention the drug, and **Barbosa,** in his description of the East Indies, published in 1514, mentions what is, in all probability, this drug under the name *Cacho*. He states that it was at that time exported from Cambay to Malacca. *Cacho* is apparently the Kanarese word *Káchu* now applied to it. It is in fact probable that the word Catechu is a modern Latin derivative from the South Indian name, and that from South India the product was first exported. Some authors, however, say that it is derived from the Cochin Chinese word *Caycau*. One of the Tamil names for the plant is *Kati*, *Kuti*, or *Cate*, and the second half of the word may have been derived from *Chuana*, to drop or distil. Whatever may be the origin of the word Catechu, it would save much ambiguity if it could be restricted to the extract from **Acacia Catechu** instead of being made popularly to include one or two other substances such as Gambier, a word of Malayan origin signifying bitter, and applied to a purely Malayan product (see **Uncaria Gambier**). It is quite true that both these astringents contain the same chemical properties, but they are obtained from widely different plants and manufactured in countries separated from each other. In our *Trade and Navigation Returns* the exportation appears as "Cutch and Gambier," from which one would naturally infer that both Cutch (or Catechu) and Gambier were exported from India, the relative proportions of which had not been determined. I am informed, however, by my friend Mr. J. E. O'Conor that this practice is a remnant of the time when the Straits Settlements returns were published with those of India. At present, therefore, by "Cutch and Gambier" is meant in all probability chiefly Catechu; a small amount only of Gambier is re-exported.

From the time **Barbosa** wrote in 1514 we have no further mention of this substance until 1574, when **Garcia de Orta** gave a complete account of the plant and the process of preparation of the extract, describing it under its Tamil name *Cate* (*Kati* or *Kuti*). It was not, however, until the 17th century that Catechu attracted the attention of Europe. It was then supposed to be a natural earth, and as it reached Europe by way of Japan (being simply re-exported from that island) it received the name of Terra Japonica. At this period, or shortly after, Gambier also found its way to Europe, and was indiscriminately with Catechu called Terra Japonica. **Oleyer** exploded the mineral notion regarding Catechu, and in 1685 republished **Garcia de Orta's** account of the preparation of the extract, and declared it to be of Indian origin, the best quality coming from Pegu and other sorts from Surat, Malabar, Bengal, and Ceylon.

Catechu (from **Acacia Catechu**) was received as an officinal drug into the *London Pharmacopœia* of 1721. It was officinal in the *British Pharmacopœia* of 1864, but has since been discarded and Gambier retained, both in Great Britain and India, as the officinal form of the drug Catechu. In the *United States Pharmacopœia* Catechu (from **A. Catechu**) is retained, however, as officinal and Gambier discarded.

138 **Interesting Ethnological Facts connected with the Catechu Industry.**—Before passing to discuss the chemical properties and modes of preparation of Cutch (Kutch) and *Káth*, the digression may be regarded as not altogether inappropriate to say something of the race of people who, from time immemorial, have made it their sole occupation to prepare this extract. A brief history of this nature it is thought may help to throw some light upon questions connected with the early history of the drug, and may prove interesting to those who have not the opportunity of consulting the voluminous gazetteers and official records from which it is extracted. In his *Himálayan Districts* (which constitutes Vol. X. of *N.-W. P. Gazet-*

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teer) **Mr. Atkinson** says: "The men employed are of the *Dom* caste, and are called *Khairís*, from the vernacular name of the tree."

In the *Bombay Gazetteer*, Vol. XIII., an interesting account of the *Káthkarís* is given, of which the following synopsis contains the most interesting features. It is stated that the *Káthkarís*, or makers of *káth*, are believed to have entered the district of Thána from the north and to have been originally settled in the *Gujarát Athávisi*, the present district of Surat. According to their story, they are descended from the monkeys which the god *Rám* took with him in his expedition against the demon-king of Ceylon. They are darker and slimmer than other forest tribes. They have no peculiar language of their own, but in conversation they have a tendency to reduce words and shorten speech, and uniformly endeavour to get rid of the personal, not the tense, inflections of the verbs. The women are strong and healthy, and pass through child-birth with little trouble or pain. They are said, sometimes when at work in the fields during the rains, to retire behind a rice-bank and give birth to a child, and, after washing it in the cold water, to put it under a teak-leaf rain-shade and go back to their work. They are divided into two sections—*Sons* or *Maráthás* and *Dhors*. The former do not eat cow's flesh, and are accordingly allowed to draw water from the village well. They are also more or less a settled tribe. Some of them still make *káth* or catechu, but from the increase of forest conservancy the manufacture is nearly confined to private *inám* villages and to forests in Native States. When they go to the forests to make Catechu, they hold their encampment sacred, and let no one come near without giving warning. Before they begin their wood-cutting, they choose a tree, smear it with red-lead, offer it a cocoanut, and, bowing before it, ask it to bless their work. The Catechu is made by boiling the heart-juice of the *khair* tree, straining the water and letting the juice harden into cakes. The *Káthkarís* will never go in for regular cultivation; they eat rats and monkeys, and live chiefly upon jungle produce, or by theft, stealing from fields and barns.

In the tenth volume of the *Bombay Gazetteer, p. 48,* it is further stated that the "*Káthkarís,* a wild forest tribe in the Ratnágiri District, who subsist almost entirely by hunting, now that their more legitimate occupation of preparing Catechu, *káth,* has been interfered with, habitually kill and eat monkeys, shooting them with bows and arrows. In order to approach within range, they are obliged to have recourse to stratagem, as the monkeys at once recognise them in their ordinary costume. The ruse usually adopted is for one of the best shots to put on a woman's robe, *sári*, under the ample folds of which he conceals his murderous weapons. Approaching the tree on which the monkeys are seated, the disguised *shikári* affects the utmost unconcern, and busies himself with the innocent occupation of picking up twigs and leaves. Thus disarming suspicion, he is enabled to get a sufficiently close shot to render success a certainty."

"In the villages of Navágám, about 7 miles north-east, Gángadia, 11 miles south, and Nelsa, about 9 miles south-west of Dohad, every year on the day after *Holi* (April) a ceremony called the *chul* or hearth takes place. In a trench seven feet by three and about three deep, *kher* **(Mimosa Catechu)** logs are carefully and closely packed till they stand in a heap about two feet above ground. The pile is then set on fire and allowed to burn to the level of the ground. The village *Bhangia* or sweeper breaks a cocoanut, kills a couple of fowls, and sprinkles a little liquor near the pile. Then after washing their feet, the sweeper and the village headman walk barefoot hurriedly across the fire. After this strangers come to fulfil vows, and giving one anna and a half cocoanut to the sweeper and the other half cocoanut to the headman, wash their feet, and, turning to the left, walk over the pile; the fire seems to cause none of

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them any pain." (*Bombay Gazetteer, III., 310.*) At the village of Chosala about 7 miles north of Dohad, a stream runs into a cave, and on this spot an image of *Mahádev*, under the name of *Kedáreshvar*, has been set up. The place is sacred to the Bhils.

Many other similar ceremonies and sacred practices might be mentioned, showing that the preparation of Catechu dates back to the remotest antiquity. The tree is sacred to *Mangala* or *Kárttikeya*, one of the Hosts of Heaven. It receives special worship and is often mentioned in the Vedas.

FORMS OF THE CATECHU EXTRACT.

139 There are three substances, all very similar in chemical composition, derived from this plant: (1) Dark Catechu or *Cutch* used for industrial purposes; (2) Indian Pale Catechu or *Kath*, a crystalline substance eaten in *pán* or used medicinally by the Hindús, prepared from the decoction; (3) Keersal, a crystalline substance found imbedded in the wood.

Cutch. 140 1.—PREPARATION OF CATECHU OR CUTCH. The trees are regarded as mature when about a foot in diameter. They are then felled and cut up into blocks two to three feet in length. In some parts of the country the natives "test whether the tree will pay to cut by making a small notch in its heartwood. Trees between 25 and 30 years old are regarded as best suited for the manufacture, and are said to yield more or less *káth* according to the number of the white lines in the heartwood." (*Bombay Gazetteer, VII., p. 35.*) The bark and the outer white wood is removed and rejected. The red heartwood is then cut up into small chips (generally about a square inch in size). In Báriya, Gujarát, the trees are not felled, but the branches lopped and the extract prepared from them, and it is stated that in some parts of the country the unripe fruits and leaves are also used. The furnace in most frequent use is of a curious construction: it is built over, leaving a number of small openings into which the earthen pots are placed, in which the chips are boiled down into a decoction. The process is somewhat varied in different parts of the country, the departures, however, being in minor details. After being boiled, the red liquid obtained is poured over fresh chips and boiled again, and when a decoction of sufficient strength has been made, this is poured, either into larger earthen pots, or, as in Pegu, into iron bowls and boiled down into the consistency of a black paste.

141 In Baroda "the men, after removing all the sapwood and a little of the heartwood, cut it into thin chips about a square inch in size. These chips are boiled in small earthen pots with water. When sufficiently charged with *káth* the water is poured into two pots and allowed to go on boiling. The infusion in the two pots is poured into a wooden trough one yard long and eighteen inches broad, and a woman strains it through a piece of blanket about a foot square. Sitting on the ground she dips the blanket into the infusion, stirs it about, and holding it as high as she can, wrings it into the trough. This process goes on for about two hours, after which the trough is covered with a lid of split bamboos and the sediment is allowed to subside. The water is then poured off and the *káth* cut into small cakes and left to dry. On account of the destruction it causes to trees, *káth* manufacture has been stopped in the Navsári forests." (*Bombay Gaz., VII., 35.*) "In Báriya, Gujarát, during February and the three following months, *káth*-making gives employment to a large number of Kolis and Náikdás. Branches stripped of their bark are cut into small, three or four-inch, pieces and boiled in earthen pots till only a thick sticky decoction remains. A narrow pit five or six feet deep is dug and a basketful of the extract placed over the pit's mouth, the water soaks into the earth, and the refuse remains in the basket, leaving the *káth* in the pit. The

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extract is then taken out and dried on leaves in the sun." *Bombay Gaz., VI., 13.*)

In the *British Burma Gazetteer* the process is described as follows: "Three men generally work together, one cutting down the trees (*sha* or **Acacia Catechu**) and driving the buffaloes that drag them to the site of the furnace, one clearing off the sapwood and cutting the heartwood into chips, and the third attending to the fires. The chips are put into four-gallon cauldrons, which are filled up with water, and the whole is boiled for twelve hours. When the water is reduced to one half, the chips are taken out and the liquid placed in large iron pans and again boiled and stirred till it attains the consistency of syrup; the pans are then taken off the fire and the stirring continued till the mass is cool, when it is taken out and spread on the leaves, arranged in a wooden frame, and left for the night; in the morning it is dry and ready to be cut up into pieces for the market. The chips are boiled down twice, but there is not much extracted by the second boiling. There was formerly no restriction on the felling of the trees and the supply was getting exhausted; now no tree can be felled without permission, and a fee of R5 is charged for each cauldron used.

The following interesting correspondence, which has been obligingly placed at my disposal by Dr. Schlich, Inspector General of Forests, will be found to give important facts regarding the manufacture of Cutch as practised in Pegu. The Conservator of Forests in Oudh asks the Conservator of British Burma the following questions:—

Enquiry.—"In my circle the season for manufacturing Cutch extends to only three months in the year, and the rates levied here from catechu-makers are 12 annas a pot, capable of holding about 3 gallons of water or liquid substance. The rate has been raised this year from 9 to 12 annas per earthen pot, which even seems to be a very low price compared with what you get in Pegu. I should feel much obliged if you would kindly give me the following information:—

"(1) The length of the season during which cutch is manufactured in your circle;

"(2) The outturn per season per cauldron of 20 gallons;

"(3) The process of manufacturing as conducted in Pegu;

"(4) The price per maund of catechu on the spot;

"(5) The distance of the market from the forests where the cutch is sold to retail dealers and others;

"(6) What percentage of cutch is obtained from a maund of heartwood."

Answer.—"(1) Cutch is manufactured in this circle from 1st June to 31st March; but the months from December to March (inclusive) are those in which the manufacture is most energetically carried on. In April and May, and in the drier parts in March even, scarcity of water stops the work; while in the rainy season carts cannot ply, and boilers have difficulty in provisioning themselves and disposing of their cutch.

"(2) The outturn of a cauldron per season depends on such a variety of circumstances—the duration of the season, the quality of the trees, their proximity to the boiling-place, and, above all, the working days of the party—that an average cannot be struck. It may be 2,000 lbs. only, or it may reach, and even exceed, 6,000 lbs., for a cauldron of 20 gallons (those in use have a capacity of 12 gallons).

"(3) Mr. Carter, Deputy Conservator, Tharrawaddy, well describes the process of manufacture as follows:—

"For the working of one cauldron three men are necessary; but if a larger number of cauldrons are employed, there is some saving of labour. Of the three men one man is employed in felling the trees and dragging

ACACIA Catechu.

Preparations and forms of

CUTCH.

them, by means of cattle, to the cutch boiling-place. The second clears the logs of sapwood and cuts the heartwood into chips. The third attends to the fires and the boiling process. The chips are put into earthen pots, which are filled with as many chips as they will contain, then water is poured in until the pots are nearly full. The pots (which have a capacity of about 3 gallons) are then placed on the fire and boiled for about 12 hours, in which time the water is reduced to about one half the original quantity. For one cauldron, 20 to 25 of these earthen pots are employed. The cauldron is nearly filled from these pots; and when the extract in the cauldron is reduced to about one half, the cauldron is again filled from the pots, and this is repeated until the pots are emptied. The boiling process is generally accelerated by the employment of a large earthen pot, which is set up near the cauldron, and is filled at the same time as the cauldron and kept boiling, the extract from the small pots being constantly added as that in the larger pot is reduced. The cauldron is then filled from the large pot, instead of from the small ones. The Burmans call this large pot the *Ye-ni-o*, or red-water pot. The extract from the pots having all found its way into the cauldron, the boiling is continued and the liquid is stirred until it attains the consistency of syrup, and fills only about one fifth of the cauldron. The cauldron is then removed from the fire and stirred with a piece of wood, shaped like a paddle, for 4 hours or more, by which time the mass has obtained a greater consistency and is cool enough to be handled. It is then placed in a mould, like a brick mould, and is left to cool. This generally happens at night, and by next morning the result is a brick-like mass of cutch weighing 36 to 44 lbs.

"The stirring business, which takes place after the cauldron is removed from the fire, is more of a beating up, and I have never been able to ascertain what the object or effect of the process is. Cooks differ, too, in the amount of beating up that is desirable, some being satisfied with half an hour's application." The outturn of one cauldron of 12 gallons in 24 hours, when properly worked, is fairly constant at the figure given by Mr. Carter.

"(4) Cutch was worth, last year, R438 to R558 per maund (equivalent to R15, R20, and R25 per 100 viss), on the edge of the forest, according to the distance from the Irrawaddy river or the railway.

"(5) The above rates correspond to some 40, 25, and 15 miles from the markets on the railway and river, where the price was R30 per 100 viss (365 lbs.), or R658 per maund.

"(6) Regarding the amount of cutch yielded by heartwood, no reliable data are available. The yield has been stated at from 3 to 10 per cent. in weight.

"For practical purposes, I believe a ton of timber in the round may be taken to yield 250 to 300 lbs. of cutch."

By whatever process the Catechu is prepared, the final drying and hardening takes place by exposure to the sun and atmosphere.

Commercial Forms of Catechu.—In the Dún (North-West Provinces)
143 (*a*) it is then thrown (*a*) into moulds of clay, forming small squarish pieces, or
144 (*b*) (*b*) into moulds formed of leaves. In other parts of the country it is thrown
145 (*c*) upon a cloth covered with ashes of cow-dung, and (*c*) either allowed to
146 (*d*) harden into irregular slabs, or, when soft, it is cut (*d*) into blocks by means
147 (*e*) of a string. In Pegu it is manufactured into (*e*) great masses a cwt. in weight. These blocks are composed of layer upon layer of catechu, of succeeding preparations separated by leaves. As the block form enters
148 (*f*) commerce it is generally broken into (*f*) pieces which may be readily distinguished from the other forms through the presence of the dried leaves

dividing the layers. In Bombay it is described by **Dr. Hamilton** as formed into (*g*) rounded balls of the size of an orange. These are probably after-preparations, for in Thána it is made into (*h*) cakes.

CUTCH. 149 (*g*) 150 (*h*)

Description of Commercial Catechu met with in Europe.—It occurs in great masses surrounded by leaves, or broken into small blocks, in balls, cubes, or irregular-shaped pieces. In colour it is externally of a rusty brown, internally a dirty orange to dark liver colour, in some cases almost black, in others port-wine coloured. It is inodorous, with an astringent and bitter taste, followed by a sense of sweetness. It is brittle and breaks with a fracture more or less resinous and shining. The pale form *kath* is grey-coloured, porous, and under the microscope is seen to be composed of agglutinated masses of needle-shaped crystals.

2.—THE CRYSTALLINE SUBSTANCE KNOWN AS *Kath* (in some parts *of the country (Bombay) pronounced Káth) or the* PALE CATECHU OF INDIA.—*Kath* or Pale Catechu is the restricted name given in Northern India to a grey crystalline substance prepared from a concentrated decoction of **A. Catechu** wood by placing in it a few twigs and allowing the decoction to cool. The twigs are removed and the crystalline substance collected. Whether the liquid is rejected or afterwards boiled down to produce a poor quality of dark catechu or cutch has not been ascertained. As sold in the bazars this crystalline substance occurs either in irregular pieces or in square blocks similar to the dark orange-brown homogeneous cubes of catechu. This is the substance eaten by the natives in their *pán*, and which imparts with lime the red colour to the lips. It is apparently never exported to Europe; the name *Kath*, while chiefly applied to it, is in some parts of India erroneously applied to Cutch also. *Kath* and Cutch have by Europeans been mistaken for the same substance, but the former is much purer chemically than the latter, and it may be owing to the fact of Cutch being the form exported to Europe, that Catechu has lost the former position it held as an astringent medicine. It seems probable that the preparation of *Kath* may be a secondary process from the Cutch, since its direct preparation from the original decoction has only been observed at Kumaon, although the substance is universally used in *pán* all over India. This subject deserves to be thoroughly investigated, and the merits of *Kath* and its process of preparation made known. The dark and the pale forms of *Khadira* were both well known to the Sanskrit writers, but in later times they seem to have been confused with each other.

Kath. 151

The process of preparation of *Kathá* or *Káth* is described by **Madden**: "One portion of the *Khairis* is constantly employed in cutting down the best trees, and for these they have to search far in the jungles; only those with an abundance of red heartwood will answer. This is chopped into slices a few inches square. Under two large sheds are the furnaces,—shallow, and with a slight convex clay roof pierced for twenty ordinary-sized earthen pots. This operation takes place in about an hour and a half. The liquor resembles thin light port, and the *kathá* crystallizes on leaves and twigs thrown into it for the purpose. Each pot yields about a seer of an ashy white colour. The work is carried on for twenty out of the twenty-four hours, by relays of women and children; the men merely preparing the wood, which, after being exhausted, is made use of as fuel."

3.—KEERSAL OR KHERSAL.—From the wood of **Acacia Catechu** is occasionally obtained a pale crystalline substance known as *Khersál*. The woodmen, when cutting up the timber for fuel, sometimes come across this substance and carefully collect it, since it is much valued as a medicine by the Hindús, and fetches a high price. **Dr. Dymock** (*Mat. Med.*,

Keersal. 152

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Western Ind., 232) says of it: "Keersal or catechuic acid is obtained from cavities in the wood, and occurs in small irregular fragments like little bits of very pale catechu mixed with chips of reddish wood." "In the forests near Báriya, Gujarát, this substance is collected and is regarded as a valuable cure for coughs." (*Bom. Gas., VI., 13.*)

153 § "Cutch is in large, irregular cakes; the characteristic squares are Gambier. There are five kinds of Catechu in the Indian markets:—

(*a*) Kath in irregular fragments, eaten with pán.
(*b*) Cutch of commerce, in large, irregular cakes, soft internally.
(*c*) Cutch from Singapore, in lozenges, almost colourless.
(*d*) Gambier in characteristic squares.
(*e*) Areca-nut cutch, rarely met with." (*Surgeon-Major W. Dymock, Bombay.*)

CHEMICAL COMPOSITION.

154 **References.**—*Flück. & Hanb., Pharmacog., 1879, 243; U.S. Dispens., 15th Ed. 379; Dymock's Mat. Med. of W. Ind., 232; Bentl. & Trim., Med. Pl., II., 95; Crooke's Dyeing and Calico Printing, 490–98; Etti, Monatsh. Chem., II., 547, and Liebig's Ann., 186, p. 327; Liebermann and Tauchert, Ber. der deutsch. Chem. Ges., XIII., 694; Nees von Esenbeck, Ann. der Chem. und Pharm., I., 343; Zwenger, Ann. der Chem. und Pharm., XXXVII., 320; Hagen Ann. der Chem. und Pharm., XXXVII., 336; Van Delben and Kraut, Ann. der Chem. und Pharm., CXXVIII., 283; Schützenberger and Rack, Bullet. Soc. Chimiq. de Paris, 1865, p. 5; Meyer, Jour. de Pharm., 1870, p. 479; Watt's Dict. Chem., I., 816; Gmelin's Chem., XV. (1862), 515; Hist. des Plantes (Monogr. des Rosacées, 1869), I., 415; Year-Book of Pharm., 1881, p. 61; and 1882, p. 84.*

§ "Catechu contains a variety of tannic acid called *Mimotannic acid*, which is soluble in water, and *Catechu* or *Catechuic* acid, which is insoluble. Mimotannic acid differs from tannic acid in yielding a greenish-grey precipitate with ferric chloride, and by not producing pyrogallic acid when heated. The destructive distillation of Cutch yields *Pyrocatechin*. Quercetine is stated to be contained in Cutch. This principle is the yellow crystallizable substance to which the bark of **Quercus tinctoria**, *Oliver*, owes its colour." (*Dr. C. J. Hislop Warden.*)

The chemistry of the Catechus has occupied the attention of chemists for some time back, but as yet the views and conclusions arrived at are somewhat conflicting, and the subject may be regarded as still involved in considerable obscurity. The brief chemical note (above) which my friend **Dr. Warden** has supplied, may be regarded as an abstract of all that is known. In his "*Science Papers*" **D. Hanbury** suggests that the process by which the various kinds of Cutch, Catechu, and Gambier are obtained should be carefully studied by persons who have the opportunity of doing so on the spot, that the trees yielding each of the forms of these substances should be accurately recorded; for, he adds, "we wish to identify the trees with the respective extracts." It would seem that our ignorance upon these important points may have much to do with the conflicting chemical results which at present exist regarding the composition of Cutch. There are at least two if not three distinct products obtained from each of the Cutch-yielding trees, and it is just probable these may have been experimented upon indiscriminately by the chemists of Europe. It would be but in keeping with other instances of two or more species (still more so of members of different natural orders), yielding approximately the same product, to find that the trees which afford the Cutch of commerce produce substances chemically dissimilar. Some such explanation may be found in the future to account for a certain number of the conflicting opinions which at present exist regarding the chemical composition of Cutch and its derivatives. A similar example may be mentioned in the fact that **Aconitum**

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Napellus yields a different alkaloid from **A. ferox**, although both species have hitherto been used in the preparation of Aconitia.

Catechuic Acid. 155

Pegu Catechu, "when immersed in cold water, turns whitish, softens, and disintegrates, a small proportion of it dissolving and forming a deep-brown solution. The insoluble part is Catechin in minute acicular crystals." (*Flück. and Hanb., Pharmacog.*, 243.) When the crude Cutch of commerce is subjected to a dry heat of 110°, or 100°, in an atmosphere of hydrogen, it fuses and becomes transparent, losing 4 to 5 per cent. of its weight. It melts at 140° without further loss of water. On ignition there is left 3 to 4 per cent. of ash. If pure it should be completely soluble in boiling hot water, the solution precipitating the insoluble crystals of catechuic acid on cooling. Ether extracts from Cutch its catechin or catechuic acid, so that by precipitation from a hot solution, or by means of ether, this substance may be separated for chemical or industrial purposes.

Mimotannic Acid. 156

In addition to catechin, Cutch contains, however, other two substances, *viz.*, Mimotannic acid and a gummy extractive principle. Mimotannic acid is soluble in cold water, and by simple maceration may therefore be removed from Cutch. The solution will be observed to be of a thick chocolate colour. If heated to the boiling point it is rendered quite transparent, becoming turbid on cooling. With this solution ferric chloride gives a dark-green precipitate, which will immediately change into purple on the addition of cold water, or of an alkali.

Gummy Principle. 157

Catechuic and Mimotannic acids are present in Cutch in about equal proportions. The effect of heat upon Cutch and its compounds is most important, and, as pointed out by **Etti**, the chemical changes effected by heat afford the most likely explanation of the discordance of authors as to the formula for Catechin. According to **Liebermann**, confirmed by **Etti's** re-examination of the substance, the formula for Catechuic acid or Catechin is $C_{18}H_{18}O_8$. If a piece of Cutch be first heated in a crucible and then macerated it will be found to be completely soluble in cold water. This is explained by **Etti** as due to the formation of soluble anhydrides from Catechin, thus:

$$2(C_{18}H_{18}O_8) = 2H_2O + C_{36}H_{32}O_{14}.$$

Catechu-tannic Acid. 158

The compound thus produced is known as *Catechu-tannic acid*, and is completely soluble in cold water. By a further loss of water at 190°-200° this becomes $C_{36}H_{30}O_{13}$. Under the influence of heat the anhydride that is first formed is $C_{36}H_{34}O_{15}$, an insoluble, brownish red, amorphous powder, a substance soluble in alcohol and precipitated in crystals by lime-water. These compounds, if formed, in varying proportions, in a piece of Catechu, would greatly tend to produce conflicting chemical formulæ in the results of different experiments, and a piece of Catechu, which is found to be completely soluble in cold water, should be regarded as inferior in quality (injured through heat) and most probably adulterated by the trader.

For some time **Gautier** regarded the Catechin of Gambier as quite distinct from that obtained from Catechu, but in his more recent publications he admits them as identical. He now corrects his formula, $C_{19}H_{18}O_8$ which he published as expressing Catechin (adopted in *Flück. and Hanb. Pharmacog.*), into $C_{19}H_{20}O_8$ and suggests for this compound the name of *Methylcatechin*.

The soluble Catechu-tannic compounds constitute the active astringent principle of the drug and the tanning and dyeing property for which it justly holds so high a position for industrial purposes.

159

Preparation of Pure Catechin.—**Etti** directs that Catechu should be dissolved in about eight times its own weight of boiling water, and the liquid, after being strained through a cloth, should be set aside for some days until the insoluble Catechin subsides. This should then be collected and

CUTCH.

placed under a screw-press, being thereafter dissolved in a sufficient amount of dilute alcohol and the filtered solution shaken up in ether. The ether is next removed by distillation, and the crystals obtained washed repeatedly in pure distilled cold water. It is then found to exist in the form of almost colourless crystals.

160 **Adulteration and Detection of Catechu.—Meyer** regards ether as the best reagent for this purpose. Whether it has been partially heated or not, the whole of the Catechu-tannic compounds may be abstracted from a given weight of pulverised Cutch by repeated treatment with ether, about 53 per cent. of the original weight being thus removed. The dried residue should thus weigh about 47 per cent., the excess over this being adulterants. The chief substances used for adulteration are sand, clay, sugar, starch, and dried blood. On ignition pure Cutch should leave a residue of 3 to 4 per cent. It should be completely soluble in boiling hot water; if soluble in cold water, it may be suspected of impurities or of having been injured by heat.

TRADE FORMS OF CUTCH OR CATECHU.

From Burma. 161 (*a*) *Burma.*—It is largely prepared at Pegu, in the districts of Prome and Thayetmo; it is in fact, next to teak wood, the most valuable product of the forests of Burma. **Dr. Brandis**, in his "Forest Administration Report for 1875-76," says that more than half of the Catechu exported comes from territories beyond the frontier of Assam and British Burma. The total number of trees felled during the year 1869-70 is stated to have been 284,198 in Pegu. The total earnings of a cutch-maker, in a good season, is about R70. The Pegu season is from November to March; very little is made from July to October, and hardly any from April to May. (*Official Correspondence with the Government of India.*) Pegu Catechu, as this form is commercially known, is in the London market regarded as the most valuable, and according to *Spons' Encycl.*, p. 1983, it fetches 21*s.* to 42*s.* a cwt.; but, according to quotations published by the *Tropical Agriculturist* for 1882-83, the market value for it is 25*s.* to 37*s.* a cwt. The manufacture of Pegu Cutch in the year 1869-70 afforded, in the Prome and Thayetmo districts alone, employment for 4,000, and with their families, a total population of about 16,000 persons, yielding an article of commerce worth on the spot about three lakhs of rupees. (*Indian Agriculturist, November 1882.*)

Bengal. 162 (*b*) Next in importance is placed the so-called Bengal Catechu. This, with the exception of the supply from Chutia Nagpur, seems to come chiefly from Nepal, the Terai forests of the North-West Provinces, Oudh, and of Behar. The Kumaon form seems to be entirely *Kath*, while in the Dún forests and from the Keri Pass, **Mr. Buck** reports that Cutch is made in these forests into cubes and cakes. A most important trade exists in Cutch between Gonda and Calcutta. **Dr. McCann**, in his *Dyes and Tans of Bengal*, compiled from the correspondence and records of the Bengal Economic Museum, reports that about 1,000 maunds of Catechu is annually consigned from Hazaribagh in Chutia Nagpur to Calcutta, where it sells at from R8 to R12 a maund. He also states that the local price is from R5 to R7 a maund, while

Chutia Nagpur. 163 **Dr. Schlich** says: "It is sold in the bazars of Chutia Nagpur at R2-8 per maund." It may be here remarked that **Dr. McCann** seems to have attached too great importance to the consumption of Gambier, for he informs us that "the imports are nearly altogether Gambier, which is imported for making *pán*. None of this is re-exported, except a small quantity to the Mauritius, &c., for the *pán* of the Hindú coolies there." (*Dyes and Tans of Bengal, p. 129.*) The question of the

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imports and exports under the heading of "Cutch and Gambier" to and from Bengal is certainly obscure, but it is probable the exports, which are very considerable, relative to the entire industry, are chiefly Cutch. The imports include the Cutch coasting trade, principally from Burma (equal to more than half the entire industry), and a comparatively small quantity of Gambier imported from the Straits Settlements and consumed in India as the officinal form of the drug Catechu; "only a very small amount of this imported article is eaten in *pán*." Nearly the whole of the Cutch imported into Calcutta from Rangoon is re-exported to the United States, where it is largely used as a brown dye and as a drug. It seems probable, also, that a considerable quantity of the imported Catechu is the product of **Areca Catechu**, re-exported as the true article. In the Calcutta bazars four kinds are said to be sold: (*a*) *Belguti*, 4*d*. a pound; (*b*) Pegu, 6*d*. a pound; (*c*) Gánti, 5*d*. a pound; and (*d*) *Janakpur*, 5½*d*. a pound (*Amst. Exhib. Cat., T. N. Mukharji*). Bengal or Calcutta Cutch fetches on an average from 20*s*. to 30*s*. in the London market. On application to Calcutta for samples of the above I received from *Babu T. N. Mukharji*, the following: *1st*, *Papri*, a sample of Gambier in cubes; *2nd*, *Janakpuri*, apparently a sample of the so-called red Cutch of Upper Burma. This sample is pale pink-brown in irregular masses with fragments of wood. It has the colour and texture of Gambier, but does not exist in cubes. *3rd*, *Pegu*, irregular pieces marked with leaves, dark glassy brown. This is unmistakeably Cutch. *4th*, *Tele*, irregular masses, yellow on the outside, glassy brown within—Cutch. *5th*, *Belguti*, rounded pieces marked with leaves uniformly brown-black—Cutch. There would thus appear to be very considerable variations in the supply met with in the Calcutta market; but there seems no doubt that a certain amount of Gambier is regularly sold as Cutch; the sample called *Papri* is most distinctly Gambier, and appears to be the Singapore article; it occurs in the characteristic regular cubes.

From Calcutta. 164 (*a*) 165 (*b*) 166 (*c*) 167 (*d*)

(*c*) Bombay Cutch, in the *U. S. Dispensatory, 15th Ed.*, is said to yield a higher percentage of tannin than Bengal Cutch, but it is commercially almost unknown outside the Presidency. **Birdwood** describes four forms of it:— Bombay. 168

(1) Kauchú of Dharwar—flat, round cakes, two inches in diameter and one thick; dark brown in colour, and preserved in *bajrí* husks. Dharwar. 169

(2) South Konkan, covered with paddy husks. Konkan. 170

(3) Khandesh, in angular grains, pale earthy brown internally, darker externally. Khandesh. 171

(4) Surat, in irregular lumps from the size of a hazel-nut to a walnut. Surat. 172

Dr. Dymock gives the local value of the Surat Cutch as R20 per maund of 37½ lbs. This is the fine *kath* used with *pán supari*; common *kath* is from 4½ to 5 rupees a maund.

(*d*) The Cutch of Madras is in all probability purely the product of **Areca Catechu. Dr. Moodeen Sheriff** says that the natives of Madras do not know that **Acacia Catechu** yields Cutch, although the tree is common. Madras. 173

Up to 5th August 1875 imported Cutch and Gambier was subject to a duty of 7½ per cent.; after that date the duty was reduced to 5 per cent., and on the 9th March 1882 removed altogether.

TRADE RETURNS OF CATECHU. 174

* Cutch is exported in mats, bags, or boxes; the following table gives

* This presumes that the exports which appear in the *Trade and Navigation Returns* under the heading of Cutch and Gambier mean chiefly Cutch.

ACACIA Catechu.

Trade Returns of Catechu.

CUTCH.

the total exports of this important substance from India for the past five years:—

Years.	Weight in Cwt.	Value in Rupees.
1879-80	222,123	28,13,994
1880-81	316,077	42,22,527
1881-82	198,897	25,80,840
1882-83	246,506	30,52,434
1883-84	302,302	35,32,000

Of these amounts the following are the exports from Bengal and British Burma respectively:—

Years.	Bengal.	British Burma.
1879-80	67,757	154,290
1880-81	99,155	216,678
1881-82	57,747	141,013
1882-83	12,131	200,780
1883-84	68,885	230,005

The following analysis of the exports of Cutch shows the Provinces from which shipped and the countries to which consigned for the year ending 31st March 1884:—

Presidency from which exported.	Weight in Cwt.	Value in Rupees.	Country to which exported.	Weight in Cwt.	Value in Rupees.
Bengal . .	68,885	9,15,504	U. Kingdom .	121,898	13,43,789
Bombay . .	3,263	33,582	Egypt . .	51,284	5,82,814
Madras . .	149	2,814	St. Helena .	33,020	3,89,920
British Burma .	230,005	25,80,100	U. States .	67,566	9,01,513
			Straits . .	21,887	2,33,503
			O. Countries	6,647	80,461
Total .	302,302	35,32,000	Total .	302,302	35,32,000

THE DYE.

DYE. 175

A solution of Catechu is, by the action of lime or of alum, changed into a dull red colour, which constitutes a fairly good dye, and is used for that purpose in some parts of India; the extract may be used or the heartwood broken up and boiled with the lime. With salts of copper and salammoniac, Catechu gives a permanent bronze brown, much

used by the calico printers of India. This colour is deepened by the use of perchloride of tin, with the addition of copper nitrate. In Dinajpur the red expectoration from chewing the *pán* is preserved and used as an auxilliary in dyeing *eri* silk. **Dr. McCann**, in his *Dyes and Tans of Bengal*, mentions a dye-combination, and **Mr. Buck**, in his *Dyes of the North-West Provinces*, adds several others in most of which lime constitutes the metallic agent. The rationale of these dyes lies in the fact that, under the influence of oxidising agents (chiefly metallic salts) the soluble Catechu compounds are converted into insoluble and thus permanent dyes. By the calico printers of Upper India 2 lbs. of Catechu are boiled in 3 gallons of water. To this solution is added 1 lb. of shell lime, and the mixture set aside for 12 hours. The surface coloured liquid is skimmed off and preserved as the printing "standard." In this case the oxidisation has taken place, or nearly so, before the colour is printed on the fabric. In Europe this is never done, the dye-solution containing soluble Catechin and Gum is printed on the fabric and the oxidisation accomplished within the tissue. This is a much more effectual and permanent process. The dyed fabric would in time become oxidised by exposure to the air, but the process is completed more rapidly by exposing the fabric to steam, or much more expeditiously by the still more modern process of passing it through a solution of bichromate of potash. The oxy-salts of copper along with salammoniac are also sometimes used for this purpose, and at one time enjoyed a high reputation. Milk of lime is selected as the oxy-salt when the colours employed in the prints, such as blue, are naturally fixed by that agent. DYE. 176

There are several "standards" adopted by the European calico-printer containing Catechu, of which the following are the more important:

BROWN STANDARD.—Water 50 gallons, Catechu 200 lbs. Boil for six hours, add acetic acid 4½ gallons, and make up to 50 gallons by adding water. Allow to stand for two days, thereafter decant the clear solution, heat to 54° C., and add salammoniac 96 lbs.; dissolve and allow to settle for 48 hours. Decant the clear portion and thicken with 4 lbs. of gum Senegal per gallon. Brown Standard. 177

MADDER BROWN STANDARD to resist heavy purple colours.—Catechu ¼ lb.; salammoniac, ½ lb.; lime-juice at 8° Tw., 1 quart; nitrate of copper at 8° Tw., 2½ oz.; acetate of copper, 1½ oz.; gum Senegal, 1 lb. (*Spons' Encycl. 840*). Madder Brown. 178

THE TAN.

As a tan Catechu extract does not hold a very high position owing to the colour it imparts to the skin. It is said to contain from 45 to 55 per cent. of tannin, or about 10 per cent. less than divi-divi pods and 20 per cent. less than gall-nuts. TAN. 179

FIBRE.

The Kew Museum catalogue describes a sample of fibre said to be prepared from the bark of this plant. I can find no record of fibre being prepared in India from the *Khair* tree. FIBRE. 180

THE MEDICINE CATECHU. 181

Vern.—*Kath, katthá*, HIND., BENG.; *Kath, kach*, PB.; *Káth*, BOMB., MAR., and SIND; *Kattakambu, káshu, káshu-katti*, TAM.; *Kánchu*, TEL.; *Katti, kashi-katti*, MAL.; *Káchu*, KAN.; *Kaipu*, CINGH.; *Kátho*, GUJ.; *Katu*, SWAHILI; *Khadira khadirasára*, SANS.

References.—*Pharm. Ind., 62; U.S.Dispens., 15th Ed., 379; Flück. & Hanb., Pharmacog., 1879, 244; Bentl. and Trimen, Med. Plants, 95; Royle's Mat. Med., Ed. Harley, 640; Dymock's Mat. Med., W. Ind., 230; U. C. Dutt's Mat. Med., Hindús, 158; O'Shaugh. Disp., 302; Bidie's Cat. Prod.*

ACACIA Catechu.

Medicinal Properties of Catechu.

MEDICINE.

Madras at Paris Exhib., 1878, p. 6; Murray's Drugs of Sind, p. 138; Birdwood's Bomb. Prod., 26; Stewart's Pb. Pl., 52; Moodeen Sheriff's Sup. to Pharm. Ind., 20; Ainslie's Mat. Ind., I., 63 and 590.

PROPERTIES AND THERAPEUTIC USES.

MEDICINE Extract. 182

THE RESINOUS EXTRACT is a powerful astringent, and may be used where most other astringents are indicated.

Internally it is useful in diarrhœa with pyrosis, depending upon a relaxed state of the mucous membrane. (*Pharm. Ind.*) Recommended to be given to adults in the form of a simple powder along with honey, 15-20 grains, or for dysentery in larger doses up to one drachm. It holds the reputation of being useful in intermittent fevers and scurvy. "A small piece held in the mouth and allowed slowly to dissolve is an excellent remedy in relaxation of the uvula and the irritation of the fauces and troublesome cough which depend upon it." (*U. S. Disp.*) The Hindú physicians recommend a piece of Catechu, rubbed with oil, to be kept in the mouth in hoarseness. (*U. C. Dutt.*) Catechu, boiled down in five times its weight of water, to one eighth, then flavoured with nutmeg, camphor, and betel-nut and made into balls of a convenient size, is directed to be kept in the mouth for affections of the gums, palate, tongue, and teeth.

Injection. 183

Ainslie cautions the free use of Catechu in ordinary diarrhœa until the full extent of the complications with the liver have been ascertained.

"*Locally* it holds a high reputation in ptyalism, ulceration, and sponginess of the gums, relaxation of the uvula, hypertrophy of the tonsils, &c." (*Pharm. Ind.*) An injection of the aqueous solution is often used in leucorrhœa and atonic menorrhagia. "In obstinate gonorrhœa, gleet, and leucorrhœa we have found it highly beneficial." (*U. S. Disp.*) A useful injection for severe hæmorrhage after confinement. By Hindú physicians it is much used both internally and externally in skin diseases: "a decoction of Catechu is used as a wash for inflamed parts and ulcers." (*U. C. Dutt.*) **Stewart** says it is used in the Panjáb externally "in ointment for itch, syphilis, and burns." "Chronic ulcerations, attended by much fœtid discharges, are frequently speedily benefited by the use of an ointment composed of the fine powder and lard; and in obstinate cases with the addition

Ointment. 184

of sulphate of copper. In prolapsus ani and protruding piles, Catechu, with lard and opium, has been found of great service; bathing or fomenting

Dentifrice. 185

with an infusion of Catechu is also beneficial." (*Murray, p. 138.*) Recommended as a dentifrice in combination with powdered charcoal, peruvian

Powder. 186

bark, myrrh, areca-nut burned to charcoal, powdered almond shell, and many other combinations in which the Catechu exercises the chief influence.

Opinions of Medical Officers.—§ "As a styptic in hæmorrhage the

187

powdered extract has been found useful if sprinkled over the wound." (*Civil Surgeon, Aligarh.*) "Reported to be beneficial as a local application in primary syphilitic sores." (*Dr. Parker, Poona.*) "A useful application to sore nipples and as a preventive against the ill effects of nursing, may be used in infusion as a wash, for some weeks before confinement." (*Surgeon-Major Hunter, Karachí.*) "Mixed with aromatics it is used by natives in melancholia; powdered and mixed with water it is used in conjunctivitis. Hakims state that it will produce abortion, but that, at the same time, it is useful for women who are barren but are desirous of having offspring (?)" (*Dr. Emerson, Calcutta.*) "Powdered and rubbed up with sulphate of copper and yolk of eggs it is a common application to cancers in East Africa." (*Surgeon-Major Robb, Bombay.*) "A mixture

Kathbol. 188

of Catechu and Myrrh, called *Káthbol,* is very generally given to women after confinement as a tonic and to promote the secretion of milk." (*Surgeon-Major W. Dymock, Bombay.*)

Medicinal Properties of Catechu.

ACACIA **Catechu.**

MEDICINE. 189

"It is used internally in congestion of the fauces, sore-throat, hæmoptysis, diarrhœa, and dysentery. Externally, it is used as a wash in hæmorrhagic ulcers, and with burnt areca-nut in soft chancres. It is believed to be anaphrodisiac and to cause impotence when used in excess." (*Brigade Surgeon J. H. Thornton, B.A., M.B., Monghyr.*) "It is a valuable astringent. Internally, the extract, with opium or other medicines, is preferable in a pillular form; dose gr. 5 to 15 grains. The tincture is less efficacious. Externally as a gargle and as a wash it is very serviceable where an astringent is wanted. The tincture is a good application to sore or spongy gums." (*Surgeon R. L. Dutt, M.D., Pubna.*) "A most efficient and useful astringent, largely used in Charitable Dispensaries and Hospitals." (*Brigade Surgeon S. M. Shircore, Moorshedabad.*) "Much used in cleaning the tongue and the gums of infants; and is a preventive to the formation of ulcers." (*Surgeon-Major J. M. Zorab, Balasore.*) Tincture. 190

"Astringent and tonic in diarrhœa, in combination with aromatics, such as cinnamon and nutmeg." (*Surgeon C. M. Russell, Sarun.*) "Pale catechu is also used in soft chancre, after it has been softened in water and made into a paste." (*Surgeon Anund Chunder Mookerjee, Noakhally.*) "The only fact worth recording about this well-known drug, is its supposed anaphrodisiac properties. It is taken in doses of from ten to twenty grains (the powder being simply mixed with water) by Hindú widows with a view of suppressing sexual desire." (*Surgeon R. G. Mathew, Mozufferpur.*) "Catechu, with areca-nut slightly toasted and pounded into an impulpable powder, is in common use by the natives for sponginess of the gums, but the prolonged use of it darkens the teeth." (*Hon. Surgeon Easton Alfred Morris, Negapatam.*) "Combined with the seeds of **Bonducella** and with sulphate of iron it is used for strengthening the gums." (*Surgeon-Major John Lancaster, M.B., Chittore.*) 191

"Dose five to twenty grains as an astringent, one to four grains as an expectorant. It is used in bronchial affections with sugar-candy and turmeric. Frequently prescribed in diarrhœa as an astringent, also as an astringent lotion in conjunctivitis and to ulcers. It is supposed to have an analogous action to that possessed by ergot on the womb, when prescribed with myrrh. It increases the secretion of milk after delivery." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "The powder is useful in otorrhœa; it is also made up into an ointment with *ghí* and applied to cancers." (*Surgeon James McCloghey, Poona.*) 192

OFF. PREPARATIONS.

"**Infusion.**—160 grains in 10 fl. ounces. Dose one to two fluid ounces. 193

"**Tincture.**—2½ ounces in 1 pint. Dose one and a half to two fluid drachms. A valuable adjunct to Mistura Cretæ and other astringent mixtures. 194 195

"**Compound Powder.**—Dose fifteen to thirty grains. A valuable aromatic astringent." (*Pharm. Ind.*) 196

KEERSAL OR KHERSAL.—The crystalline form of Catechuic acid, found naturally in crevices of the wood, fetches a high price in India as a drug, and is regarded as a valuable cure for coughs. (*See page 35.*)

FOOD.

The chief product of this tree is *Kath* and Cutch, obtained by boiling down a decoction from the chopped wood, say for 20 hours continuously. In the preparation of *kath* twigs are placed in the boiling liquid and upon these crystals of the substance generally known as *kath* are deposited. Both *Kath* and Cutch are commercially designated Catechu, but the FOOD Pan. 197

The Soap-Acacia.

FOOD. former is regarded as purer than the latter, and is largely used as an ingredient in the *pán* or the betel-leaf preparation which the natives of India are so fond of chewing. The *Kath* is reduced to a fine powder, a little of which is smeared on the *pán* leaf, together with some white lime and crushed betel-nuts. It is the *Kath*, in combination with the lime, which gives the teeth and lips the red colour so characteristic of Hindús. Continued use blackens the teeth. The people of Assam very seldom eat *Kath* with *pán*, as they consider it too rich for them. (*Mr. Darrah, Assam.*)

THE TIMBER.

TIMBER. 198 **Structure of the Wood.**—Sapwood yellowish white; heartwood either dark or light red, extremely hard. The wood seasons well, takes a fine polish, and is extremely durable. **Cleghorn** says the wood of this plant is less hard and durable than that of other Acacias. It is not attacked by white-ants or by teredo.

199 It is used for rice-pestles, oil and sugarcane crushers, agricultural implements, bows, spear and sword handles, and wheelwrights' work. In Burma it is employed for house-posts, and very largely as firewood for the steamers of the Irrawaddy Flotilla. The felling of Cutch trees for the purpose of fuel should, however, be altogether prohibited, although the wood is greatly admired for its high heating powers. It is much valued in Broach for posts which have to be driven into the ground. The fuel of the dead *khair* is much valued by goldsmiths. In North India it is made into charcoal, and is one of the best woods for that purpose. It has been found good for railway sleepers, and it is probably only the smallness of the tree and the consequent waste in cutting up, that has prevented its more general use. A cubic foot of the wood weighs about 70 lbs.

Several other plants yield Catechu, such as **A. Suma, Areca Catechu,** and **Uncaria Gambier,**—see **Catechu.**

Acacia Campbellii, *Arn.*

Syn. for **A. planifrons,** *W. & A.*

A. chrysocoma, *Miq.*

Syn. for **A. tomentosa,** *Willd.*

200 **A. concinna,** *DC.; Fl. Br. Ind., II., 296.*

Syn.—MIMOSA CONCINNA, *Willd.; Roxb., Fl. Ind., Ed. C.B.C., 424.*

Vern.—*Rithá, kochi,* HIND.; *Ban-rithá,* BENG.; *Toldúng,* LEPCHA; *Saptalá,* SANS.; *Aila, rassaul,* OUDH; *Sika, shika,* BOMB., *Sikekái,* MAR., DUK.; *Shiká kái,* MAR.; *Chikakai,* GUJ.; *Shika,* TAM.; *Chikaya, shikáya, gogu,* TEL.; *Sigé, sige* (the unripe fruit being known as *kayi*), KAN.; *Ken bwon, kinbun, subóknwé* (or *su-kwot-nwé* or *soop-wotnwáy*), BURM.

Rita or *ritha* is the Hind. for the Soap-nut, **Sapindus Mukorosi,** *Gærtn.* As this name is also given to the detergent legumes of **Acacia concinna,** *DC.,* the two bazar products require to be carefully distinguished.

References.—*Brandis, For. Fl., 423; Gamble, Man. Timb., 150.*

Habitat.—A common, prickly, scandent bush, common in the tropical jungles throughout India; in Bengal flowering during the rains. Very common in East and Central Mysore planted as a hedge.

Botanic Diagnosis.—*Prickles* abundant, minute, hooked. *Leaves* with 12-16 pinnæ and 30-50 leaflets; *stipules* and *bracts* cordate, ovate. *Flowers* in copiously panicled, globose, yellow heads; *panicles* with densely downy branches, the lower springing from the axils of the leaves, the upper

subtended by copious, membranous, subpersistent *bracts*. *Corolla* a little longer than the calyx. *Pod* thick, succulent, strap-shaped, straight, 3-4 by ¾ inches, depressed between the seeds, the broad sutures narrowed to a short stalk; *when dry, shrivelled and rugose with slightly waved sutures, when young hairy.*

This species belongs to the series **Vulgares.** Climbers with copious scattered prickles and flowers in globose heads forming panicles:—

A. concinna, A. Intsia, and **A. pennata.**

Properties and Uses—

Dye.—**Balfour** says the bark is used for dyeing and tanning fishing-nets in South India. **DYE. 201**

§ "The bark is imported into Bombay from Kanara for this purpose." (*Surgeon-Major W. Dymock, Bombay.*)

"Turmeric and the leaves of this acacia afford a beautiful green dye (*Mason*)." (*I. N. Pickard, Esq., Burma For. Dept.*)

Soap.—" A considerable trade is carried on in some parts of India with the saponaceous legumes of this species." (*Roxburgh.*) The thick fleshy pods are used for washing the hair (*Gamble*). The nut of the *Shikákái* is used in the Kolába district, Bombay, instead of soap (*Bombay Gaz., XI., 26*). In Kanara they sell at R12 to 20 for 560 lbs; every other year comes a bumper crop (*Bombay Gaz., XV., Part I., 60*). **DETERGENT. Pods. 202**

The legumes of several other species of **Acacia** are also used for this purpose, being regarded as efficacious in destroying vermin. To **Ainslie** must be attributed all our information regarding these pods, very little having been obtained regarding them since he wrote.

Medicine.—The pods are largely used by the natives of India externally as a detergent, and internally they are deobstruent, and, according to **Ainslie**, are also expectorant. **Ainslie** recommends the drug to be prescribed in the form of an electuary, in a dose about the size of a small walnut, every morning for three successive days. **Dr. Dymock** gives the value in Bombay as R1½ to 1¾ a maund of 37½ lbs. **MEDICINE. Pods. 203**

§ " In South India the pods and leaves are used as an aperient in bilious affections. (*Ainslie.*)" (*Surgeon-Major W. Dymock, Bombay.*) "The pods of **A. concinna** are a mild cathartic, nauseant, and emetic. As a cathartic it is superior to senna, but it is rather nauseous and disagreeable in taste and smell. Like senna, it is not an efficient purgative when used alone, but a very good adjunct to other purgatives, as sulphate of magnesia. The pods are also a pretty good emetic in jaundice not depending upon obstruction." (*Honorary Surgeon Moodeen Sheriff, Khan Bahadur, Madras.*) " A popular household remedy for promoting the growth of hair and removing dandriff from the scalp, a decoction of pods (½ an ounce to the pint of water) being used as a hair-wash. In small doses the pods act as a tonic, but in large and repeated doses they have purgative and emetic properties assigned to them." (*Surgeon-Major J. M. Honston, Travancore; and John Gomes, Medical Store-keeper, Travandrum.*) **204** **Hair-wash. 205**

"Very young leaves, ground up with a little salt, tamarind, and a few chillies, are used by the natives as a chutney with their food when they suffer from biliousness. I have seen it act as a laxative producing one or two copious motions, deeply tinged with bile; it is also a detergent." (*Honorary Surgeon Easton Alfred Morris, Negapatam.*) "Powdered leaves, in form of infusion, act as a mild laxative; can be used as a substitute for Senna indica, but less powerful in action. Tender leaves are used by natives in the form of chutney in bilious affections, with successful results. (*Surgeon E. W. Savinge, Rajamundry, Godavery District.*) "The tender leaves made into a decoction are used as an aperient." (*Surgeon-Major John Lancaster, M.B., Chittore.*) "The **Leaves. 206**

ACACIA decurrens.

The Silver Wattle.

tender leaves are subacid and make a good chutney. The pods are in daily use for washing purposes." (*Native Surgeon Ruthnam T. Moodelliar, Chingleput, Madras.*) "An infusion made from the pods is given to check malarious fevers. The tender leaves made into infusion, or ground down into a paste, are used to prevent flatulence, and to act as a mild laxative." (*Dr. Lee, Mangalore.*) "The pods of this species are largely used for washing the hair in Madras." (*Deputy Surgeon-General G. Bidie, M.B., C.I.E., Madras.*) "The pods are used in the form of an ointment in skin diseases." (*Surgeon J. Parker, M.D., Poona.*)

FOOD. The Leaves. 207 **Food.**—The leaves are pleasantly acid, and they are sometimes used by the Hindús as a substitute for tamarind, and are made into chutney.

DOMESTIC. Pods. Soap. 208 **Domestic Uses.**—The Hindús, according to **Drury**, use the (legumes) pods to mark the forehead. This statement requires confirmation. They are largely used as a substitute for soap, especially to wash the hair. "The *sige kayi* or soap-nut is planted for village hedges in the East, but it grows wild in Manjarabad and Belur." (*Mysore Gaz., 291.*)

209 **Acacia dealbata,** *Link.; Fl. Br. Ind., II., 292.*

THE SILVER WATTLE.

References.—*Brandis, For. Fl., 180; Gamble, Man. Timb., 155; Benth., Fl. Austr., II. 415; Mueller's Extra-Tropical Plants, 4.*

Habitat.—A tree, spreading rapidly by numerous root-suckers, indigenous in New South Wales, Victoria, and Tasmania, introduced on the Nilgiris, and now naturalised since 1840. Experimentally cultivated in the Panjáb.

TIMBER. 210 **Structure of the Wood.**—The wood is moderately hard, light brown, but warps considerably. It is extensively used in Australia for timber.

According to **Mueller** this is placed as a variety under **A. decurrens,** *Willd.*, the Black Wattle. "*It prefers for its habitation humid river-banks*, and attains there a height of sometimes 150 feet, supplying a clear and tough timber, used by coopers and other artisans, but principally serving as select fuel of great heating power."

TAN. Bark. 211 **Tan.**—"The bark of this variety is much thinner and greatly inferior to the Black Wattle in quality, yielding only about half the quantity of tanning principle. It is chiefly employed for lighter leather. This tree is distinguished from Black Wattle by the silvery or rather ashy hue of its young foliage; it flowers early in spring, ripening its seed in about five months, while the Black Wattle blossoms late in spring or at the beginning of summer, and its seeds do not mature before about 14 months." (*Baron von Mueller, Select Extra-Tropical Plants, 4.*)

Introduced in the Nilgiris, where "A very curious fact has been observed about the wattle tree. In 1845 and up to about 1850, the trees flowered in October, which corresponded with the Australian flowering time, but about 1860 they were observed to flower in September; in 1870 they flowered in August; in 1878 in July; and here this year, 1882, they have begun to flower in June, this being the spring month here, corresponding with October in Australia." It is very curious that the tree takes nearly 40 years "to regain its habit of flowering in the spring," *i.e.*, to become perfectly acclimatised. (*Ind. For., VIII., 26.*)

212 **A. decurrens,** *Willd.*

THE BLACK WATTLE.

Habitat.—The eastern part of South Australia, through Victoria and New South Wales to the southern part of Queensland.

The Black Wattle.

ACACIA dumosa.

A small or middle-sized tree. The bark constitutes the tanner's wattle-bark. It is rich in tannin, and this fact, together with the many uses of the gum derived from the tree, make this one of Australia's most valuable plants.

TAN.—In England the price of wattle-bark runs from about £8 to £11; in Melbourne about £5 a ton. "It varies, so far as experiments made in my laboratory have shown, in its contents of tannin from 30 to 54 per cent. in bark artificially dried. In the mercantile bark the percentage is somewhat less, according to the state of its dryness, it retaining about 10 per cent. moisture; 1¼ lb. of black wattle-barkgives 1 lb. of leather, whereas 5 lbs. of English oak-bark are requisite for the same results, but the tannic principle of both is not absolutely identical. Melbourne tanners consider a ton of black wattle-bark sufficient to tan 25 to 30 hides; it is best adapted for sole leather and other so-called heavy goods. The leather is fully as durable as that tanned with oak-bark, and nearly as good in colour. Bark carefully stored for a season improves in tanning power 10 to 15 per cent. From experiments made under the author's direction it appears that no appreciable difference exists in the percentage of tannin in wattle-bark, whether obtained in the dry or in the wet season. The tannin of this Acacia yields a grey precipitate with the oxide salts of iron, and a violet colour with sub-oxides; it is completely thrown down from a strong aqueous solution by means of concentrated sulphuric acid. The bark improves by age and desiccation, and yields about 40 per cent. of Catechu, rather more than half of which is tannic acid. Bichromate of potash, added in a minute quantity to the boiling solution of Mimosa tannin, produces a ruby-red liquid, fit for dye purposes; and this solution gives, with the salts of sub-oxide of iron, black pigments, and with the salts of the full oxide of iron, red-browndyes. As far back as 1823, a fluid extract of wattle-bark was shipped to London, fetching then the extraordinary price of £50 per ton, one ton of bark yielding 4 cwts. of extract of tar consistence (Simmons), thus saving much freight and cartage. For Cutch or Terra Japonica the infusion is carefully evaporated by gentle heat. The estimation of tannic acid in Acacia barks is effected most expeditiously by filtering the aqueous decoction of the bark after cooling, by evaporating and then re-dissolving the residue in alcohol and determining the weight of the tannic principle obtained by evaporating the filtered alcoholic solution to perfect dryness." **TAN. Bark. 213**

"The cultivation of the black wattle is extremely easy, being effected by sowing either broadcast or in rows. Seeds can be obtained in Melbourne at about 5*s*. per lb., which contains from 30,000 to 50,000 grains. They are known to retain their vitality for several years. Seeds should be soaked in warm water before sowing. Any bare, barren, unutilised place might most remuneratively be sown with this Wattle Acacia; the return would be in from five to ten years. Full-grown trees, which supply also the best quality, yield as much as 1 cwt of bark." I have taken the liberty to extract almost the entire article published by **Baron von Mueller, K.C.M.G.**, in his exceedingly valuable work "*Select Extra-Tropical Plants,*" thinking it was certain to prove most useful to persons experimenting in India with the cultivation of the wattle or with its most valuable tanning bark. The variety **mollis** (**A. mollissima**, *Willd.*) is the most plentiful form in Victoria, and this is also admitted to be the most powerful tanning agent. It grows rapidly, and in addition to the bark and gum which it affords, the timber is much valued, chiefly as fuel. **TIMBER 214**

A fuller account of this plant and of the other trees yielding the commercial product will be found under the name WATTLE-BARK.

Acacia dumosa, *W. & A.*

Syn. for **A. Latronum,** *Willd.*

215 **Acacia eburnea,** *Willd.; Fl. Br. Ind., II., 293.*

Syn.—MIMOSA EBURNEA, *Roxb., Fl. Ind., Ed. C.B.C., 421.*

Vern.—*Marmati,* MAR.

References.—*Brandis, For. Fl., 183; Gamble, Man. Timb., 151.*

Habitat.—A short or small deciduous tree, met with in Sind, Suliman Range, Berar, Deccan, and South India.

Botanic Diagnosis.—General habit of **A. arabica.** *Leaves* with 4-10 pinnæ and 12-16 leaflets. *Flowers* in rounded yellow heads in the axils of undeveloped leaves; *peduncles* densely grey downy, with involucre about the middle. *Pod* narrow linear, straight, rigidly coriaceous, dehiscent, glabrous, with slightly repand sutures.

Compare with **A. arabica** and the other members of this series.

Properties and Uses—

TIMBER. 216 **Structure of the Wood.**—Hard, yellowish white; splits in drying. Weight 52 lbs. per cubic foot.

A. elata, *Wall.* Syn. for **Albizzia procera,** *Benth., var.* **elata.**

A. Farnesiana, *Wall.* Syn. for **A. planifrons,** *W. & A.*

217 **A. Farnesiana,** *Willd.; Fl. Br. Ind., II., 292; Wight, Ic., t. 300.*

THE CASSIE FLOWER, *Eng.*

Syn.—MIMOSA FARNESIANA, *Linn.*

Vern.—*Vilayati kikar, vilayati bábúl, pissi babui, gú-kikar, gand-bábúl, gúh-babúl,* HIND., DUK.; *Gúya bábúla,* BENG.; *Gabur,* SANTAL; *Gu-bábhul,* MAR.; *Talbaval,* GUJ.; *Knebáwal,* SIND; *Vedda vala, puj-velam,* TAM.; *Kusturi, piktúmi, oda sale, murki tumma, naga-túmma, kampu-túmma,* TEL.; *Jáli,* KAN.; *Hnanlóng yaing* (or *Huanlóngyaing*), *nanlon-kyaing* or *nan-loon-gyaing,* BURM.

Moodeen Sheriff seems to think that because the name *Kastúri* or *kastúri-tumma,* TEL., is inappropriate for this plant, it is incorrectly applied to it.

References.—*Roxb., Fl. Ind. Ed.C.B.C., 421; Brandis, For. Fl., 185; Gamble, Man. Timb., 150; Baillon, II., 41; Mueller, Select Extra-Tropical Plants, 4; Smith's Dict., 3; Piesse on Perfumery, 106; Hanbury's Science Papers, 151-152; Atkinson's Gums and Gum-Resins, 9.*

Habitat.—*The Flora of British India* regards this small tree as indigenous to India, "cosmopolitan in the tropics, but often cultivated." It is common enough everywhere in India and Burma, growing freely by self-sowing. Its strong-scented, yellow flower-heads perfume the atmosphere very pleasantly. Cultivated in Europe and most successfully at Cannes. It is abundant in the valley of the Dead Sea, where it is covered with the scarlet flowers of the parasite **Loranthus acaciæ,** giving the effect as if on fire.

Botanic Diagnosis.—An erect shrub or low tree, with straight spines, flowering in the cold season. *Flowers* in rounded heads, axillary, fragrant, bright yellow; supported upon *peduncles* which are crowded in the nodes of the leaves, and having a whorl of bracts like an involucre at the apex. *Pod* thick, swollen or fleshy, cylindrical, more or less curved or hooked, glabrous, and having straight sutures. *Seeds* biserial.

Allied to **A. planifrons,** *W. & A.*, a tree of the Western Peninsula, with umbrella-like spreading branches and flower-heads in clusters in the axils of mature bracts. Compare with **A. arabica.**

Properties and Uses—

GUM. 218 **Gum.**—The gum is collected in Sind; *Bomb. Gaz., XV., Part I., p. 60,* says the gum exudes from the trunk in considerable quantities. **Waring** states that it is considered superior to gum arabic in the arts and as a medicine. **Murray** remarks that it is used to adulterate gum arabic. It is

very desirable that its peculiar properties should be investigated: adulteration has, in all probability, prevented it from becoming better known. **Mr. Baden Powell** (*Pb. Pr. I., 345*) describes it "as dark, conchoidal masses, translucent and transparent at the edges. Some pieces are much whiter." GUM. 219

§ "The distilled flowers yield a delicious perfume, and the gum is generally considered useful." (*J. C. Hardinge, Esq., Rangoon.*)

"A fair substitute for gum arabic. A decoction may be used internally in diarrhœa and externally where an astringent is required." (*Surgeon R. L. Dutt, M.D., Pubna.*)

Dye and Tan.—**Christy**, in his *New Commercial Plants*, includes the bark of this tree among the Indian tans. It is not in much demand for this purpose in India, but is reported to be sometimes used in Dacca mixed with salts of iron. It gives an inky dye. The pods are also used in some parts of Bengal as a dye-stuff. (*Dr. H. McCann.*) DYE. Bark 220 PODS. 221 TAN. 222

Perfumery.—The round yellow heads constitute the Cassie flowers so much used in European perfumery. With the development of the art of perfumery in India, this plant should prove a source of wealth. It grows freely without any care whatever, and should it ever be cultivated there cannot be a doubt but that it would prove a great success. **Piesse** says that the European practice is to sow the seeds in beds, the best plants being left and the doubtful ones removed. In the third year they are two to three feet in height, and are then planted out into the fields, each tree receiving about 12 square feet. Before planting into their final places the ground is recommended to be well ploughed and manured and dug to the depth of 4 to 6 feet. The locality chosen for cultivation should be exposed to the sun. After the third year the trees produce flowers. A full-grown tree is calculated to yield 2 lbs. weight of flowers, valued at from three to four pence a lb., the acre under Cassie cultivation in Europe thus giving £30 to £40. **Hanbury**, in his "Science Papers," gives the value of Cassie flowers in Cannes as "five to six francs the kilogramme." PERFUMERY. Flower-heads. 223

The plant is wild in most parts of Bengal, and its cultivation might, if used as a hedge plant, or if scattered through the fields devoted to garden produce, be most profitable. The flowers are a certain source of wealth. The gum seems likely to hold in the future a much higher position than in the past. The pods yield dye, and the leaves, in times of scarcity, would prove an important addition to the fodder sources of the country. **Piesse** says: "I cannot leave Cassie without recommending it more specially to the notice of perfumers and druggists, as an article well adapted for the manufacture of essences for the handkerchief and pomades for the hair. When diluted with other odours, it imparts to the whole such a true flowery fragrance, that it is the admiration of all who smell it, and has not a little contributed to the great sale which certain proprietary articles have attained. The Cassie perfume retains its fragrance for a long time and is hence most useful for sachets. For this purpose a good combination is Cassie heads 1 lb., orris-root 1 lb." The perfume Cassie should not be confounded with Cassia or Cinnamon. 224

Medicine.—The bark is astringent, and is often used as a substitute for **Acacia arabica** bark. **Mr. Baden Powell** says: "the pods contain a balsamic liquid." MEDICINE. The Bark. 225

§ "It is used as an adjunct to aphrodisiacs in the treatment of spermatorrhœa." (*Surgeon-Major C. W. Calthrop, M.D., Morar.*) "The bark is used as an astringent in the form of a decoction, strength 1 to 10 of water. The tender leaves, bruised in a little water and swallowed, are said to be useful in gonorrhœa, dose ¼ ounce." (*Surgeon James McCloghey, Poona.*) Leaves. 226

Structure of the Wood.—White, close-grained, hard and tough. Weight 49 lbs. per cubic foot. TIMBER. 227

In the Panjáb usually grown as a fence, for which purpose it answers well.

DOMESTIC. 228 **Domestic Uses.**—§ "The plant is supposed to be obnoxious to rats and snakes, and is accordingly planted as a protection against the injury caused by these animals burrowing in the embankments." (*Rev. A. Campbell, Santal Mission, Pachumba.*)

229 **Acacia ferruginea,** *DC.; Fl. Br. Ind., II., 295; Bedd., Fl. Sylv., t. 51.*

Syn.—MIMOSA FERRUGINEA, *Roxb.; Fl. Ind., II., 561.*

Vern.—*Khour*, NEPAL; *Kaiger*, PANCH MAHALS; *Son khair*, BERAR; *Kar, khair*, GOND; *Pándhrá khair*, MAR.; *Teóriikhair*, BHIL; *Banni*, KAN.; *Shimai-velvelam, shemi-velvel*, TAM.; *Ana-sandra, wúni*, TEL.

References.—*Brandis, For. Fl., 185; Kurz, Burm. For. Fl., I., 423; Gamble, Man. Timb., 153.*

Habitat.—Found in Northern Bengal, Central and South India, and Gujarát.

Botanic Diagnosis.—A large deciduous tree with brown bark; *spines* short hooked, in pairs; *leaves* composed of 6-12 pinnæ and 20 to 40 leaflets. *Flowers* in peduncled spikes in the axils of the leaves; *rachis* glabrous; *corolla* 2-3 times the campanulate and glabrous *calyx*. *Pod* straight, strap-shaped, 3-4 inches long, veined, the upper suture winged, distinctly stalked, and 4-6-*seeded*.

Compare with **A. Catechu.**

Properties and Uses—

GUM. 230 **Gum.**—It yields a good gum, similar to gum arabic.

MEDICINE. 231 **Medicine.**—The bark possesses astringent properties.

TIMBER. 232 **Structure of the Wood.**—Sapwood large; heartwood olive-brown, extremely hard, harder than **A. Catechu.** Weight 70 lbs. per cubic foot. A fine timber, but little used. **Beddome** says it is used for building carts, and for agricultural implements.

A. Hookeriana, *Zippel.*

Syn. for **A. concinna,** *DC.*

A. indica, *Desv.*

Syn. for **A. Farnesiana,** *Willd.*

233 **A. Intsia,** *Willd.; Fl. Br. Ind., II., 297.*

Syn.—MIMOSA CÆSIA, *Roxb.*; M. INTSIA, *Linn.*

Vern.—*Arhai-ka-bél*, SUTLEJ; *Katrar*, KUMAON; *Kondro-janum*, SANTAL; *Kundaru*, KOL; *Harrari*, NEPAL; *Payir rik, ngraem rik*, LEPCHA; *Korinta, kórendam*, TEL.; *Chilári*, MAR.

References.—*Kurz, Burm. For. Fl., I., 423;* **A. cæsia,** *W. & A.; Brandis, For. Fl., 189;* **M. cæsia,** *Roxb., Fl. Ind., II., 565.*

Habitat.—A large climber found in the Sub-Himálayan tract from the Chenab eastward (ascending to 4,000 feet), throughout India and Burma.

Botanic Diagnosis.—*Prickles* minute hooked. *Leaves* with 12-16 pinnæ and 16-24 ligulate-oblong leaflets. *Flowers* in globose yellow heads, panicled; *bracts* minute, lanceolate. *Pod* dry, thin, straight, strap-shaped, glabrous, smooth, 4-6 inches long by ¾ to 1¼ broad, cuneately narrow to a short stalk.

Var. cæsia, *W. & A.* Leaflets 40-60, not more than $\frac{1}{12}$ to ⅛ inch broad, obtuse, with a minute point. Western Himálaya, 3,000 feet; Sikkim, 5,000 feet.

Var. oxyphylla, *Grah., sp.* Leaflets 40-50, more membranous than in the preceding, and acutely pointed.

Compare with **A. concinna.**

Properties and Uses—

Dye.—The bark or the fresh leaves of this plant are said to be used as an auxiliary or astringent in dyeing with morinda or lac, giving brightness. (*McCann.*) The bark is also used as a substitute for soap to wash the hair. (*Gamble.*) **DYE. Bark and Leaves.** 234 **SOAP SUBSTITUTE. Bark.** 235

Medicine.—§ "The flowers are used by Santal women in deranged courses." (*Rev. A. Campbell, Santal Mission, Pachumba.*) **MEDICINE. Flowers.** 236

Structure of the Wood.—White, soft, porous. **TIMBER.** 237

Acacia Jacquemontii, *Benth.; Brandis, For. Fl., 183.* 238

Vern.—*Hausa,* AFG.; *Kinkar, babúl, bamúl, babbil,* PB.; *Rátobával,* GUJ.

References.—*Fl. Br. Ind., II., 293; Gamble, Man. Timb., 150.*

Habitat.—A small bushy, thorny shrub, met with on the east flank of the Suliman Range, ascending to 2,500 and at times to 3,200 feet; on the outer Himálaya near the Jhelum to about the same elevation, on the Panjáb plains, in Sind, and on the banks of the Nerbudda. Common in ravines and dry water-courses in Rájputana and North Gujarát. (*Brandis.*)

Botanic Diagnosis.—An elegant shrub with polished stems and straight, polished, and slender spines. *Leaves* composed of 6-8 pinnæ and 12-16 leaflets. *Flowers* in rounded axillary heads, yellow, sweetly-scented. *Pod* thin, flat, broad, ligulate, dehiscent, glabrous, grey, with straight, sutures; 2-3 inches long. *Seeds* 5-6.

Allied to **A. eburnea,** *Willd.,* which has narrow pods, and to **A. tomentosa,** *Willd.,* which has purple heads. Compare with **A. arabica.**

Properties and Uses—

Gum.—§ "The var. *baonli* (*Rájputana*), a bush with straight slender branches, common in dry, sandy water-courses, yields a small quantity of gum resembling that from **Acacia arabica.**" (*E. A. Fraser, Rájputana.*) **GUM.** 239

Tan.—§ "The bark is used in tanning, and gives a brown or black colour." (*E. A. Fraser, Rájputana.*) **TAN. The Bark.** 240

Spirits.—The bark of the root is used in the distillation of spirits; the branches are lopped, and the leaves, thrashed out with sticks, are used as fodder. (*Brandis.*) **Spirits.** 241 **FODDER. The Leaves.** 242

Domestic Uses.—The polished stems and thorns and the sweetly-scented yellow flowers make this bush an object of much beauty and interest (*Ráj. Gas., 29*). Might with advantage be extensively cultivated as a hedge plant and its flowers collected for perfumery purposes. **DOMESTIC. Hedge.** 243

A. Latronum, *Willd.; Fl. Br. Ind., II., 296; Wight., Ic., t. 1157.* 244

Vern.—*Bhes,* HIND.; *Devbábhul,* MAR.; *Paki-tuma,* TEL.; *Donn mulli-na-jali,* KAN.; *Hote-jali,* MYSORE.

References.—*Brandis, For. Fl., 180; Gamble, Man. Timb., 149.*

Habitat.—A thorny shrub found in South India, forming gregarious thickets.

Botanic Diagnosis.—A small tree with umbrella-like head and brown glabrous branches; *spines* in pairs, long, straight. *Leaves* composed of 6-10 pinnæ and 20-30 leaflets. *Flowers* in pedunculate spikes, abundantly produced from the nodes of leafless branches; *corolla* $\frac{1}{12}$ inch long and 3 or 4 times the minute campanulate and glabrous *calyx.* *Pod* oblong, thin, flat, somewhat recurved.

In the nature of its spines this species departs from the character of the series, having more the form of the spines of **A. arabica** (series **Globiferæ**). See **A. Catechu.**

Properties and Uses—

FIBRE. Bark. 245 **Fibre.**—It is said to yield a good fibre. Bark dark brown, dotted with white. (*Brandis.*)

TIMBER. 246 **Structure of the Wood.**—Useful for tent-pegs. (*Bomb. Gaz., XV., Part I., p. 60.*)

247 **Acacia lenticularis,** *Ham.; Fl. Br. Ind., II., 296.*

Vern.—*Khin,* KUMAON.

References.—*Brandis, For. Fl., 186; Gamble, Man. Timb., 150.*

Habitat.—A small tree of the Siwaliks and of Kumaon, extending to the Rájmahal Hills in Bengal, to Central and South India and Burma.

Botanic Diagnosis.—*Spines* in pairs, short, hooked or recurved. *Leaves* with 4-8 pinnæ and 12-16 leaflets. *Spikes* very dense, shortly pedunculate, 3-4 inches long. *Corolla* twice the length of the campanulate *calyx*. *Pod* straight, 6-8 inches long by ⅘ broad, thin, flat, opaque, venulose, with both sutures thickened and winged.

Compare with **A. Catechu.**

GUM. 248 **Gum.**—Yields an Acacia gum.

249 **A. leucophlœa,** *Willd.; Fl. Br. Ind., II., 294; Bedd., Fl. Sylv., t. 48.*

Syn.—MIMOSA LEUCOPHLŒA, *Roxb.*

Vern.—*Safed kikar, rerú, raunj, karír, nimbar, ringa, rinj, rohani, jhind,* HIND.; *Safed-bábúl,* BENG.; *Sharáb-ki-kikar, hivar,* DUK.; *Goira,* URIYA; *Shvéta-barbúra-vrikshaha,* (modern) SANS.; *Safed kikar,* PB; *Arinj,* RAJ.; *Raundra, runjra,* BANSWARA; *Renuja,* BIJERAGOGARH; *Tumma, reúnja, rinja,* GOND.; *Hewar,* C. P., MAR.; *Haribával,* GUJ.; *Hivar, pánharyá bábhuliche jháda,* MAR.; *Vel-velam, vel-vel, vevay-lam,* TAM.; *Tella-tuma,* TEL.; *Bili-jáli, togral naibela,* or *náyi béla* (*Gaz. Mysore*), *vel-vaila, bilijali topál,* KAN.; *Katu, vela maram, andara,* SINGH.; *Tanaung,* BURM.

References.—*Brandis, For. Fl., 184; Kurz, Burm. For. Fl., I., 421; Gamble, Man. Timb., 152; Roxb., Fl. Ind., Ed. C.B.C., 421; Atkinson, Gums and Gum-resins, p. 9.*

Habitat.—Found in the plains of the Panjáb from Lahore to Delhi, and in all forest tracts of Central and South India, Rájputana, and Burma (in the dry forests of Prome). Seems indifferent to climatic conditions.

Botanic Diagnosis.—A large, deciduous tree, with short, straight, and white spines. *Leaves* composed of 12-24 pinnæ and 30 to 60 leaflets. *Flowers* in small, rounded, yellow heads, aggregated into terminal *panicles,* which, when fully expanded, are a foot long and broad, and densely tomentose. *Pod* sessile, narrow ligulate-falcate, thin, flat tomentose, with straight sutures. The inflorescence of this species is its most characteristic feature.

Compare with **A. arabica.**

Properties and Uses—

GUM. 250 **Gum.**—The gum yielded by this plant is used in native medicine; it somewhat resembles gum-bassora, and received that name from **Ure.**

DYE. Leaves and Bark. 251 **Dye.**—The leaves and bark are used in dyeing, and give a black colour. The bark is also used for dyeing in Burma and gives a red colour, but mixed with other barks gives black. (*Prof. Romanis, Rangoon.*)

Dr. Schlich (*C. P. Forest Adm. Report, 1883, p. 45*) says he found the bark of *Hewar* being prepared for export, but he seems to have omitted to note the economic use for which it was to be exported.

FIBRE. Bark. 252 **Fibre.**—A coarse, tough fibre is prepared from the bark, much valued for fishing-nets and ropes (*Bom. Gaz., XII., 25; also XV., Part I., p. 60*).

Dr. Brandis says by steeping the bark in water for four or five days and

beating it, a tough fibre may be obtained, which is used for making nets and coarse cordage.

Medicine.—The bark partakes more or less of the astringent properties of **A. arabica.** In an official correspondence with the Government of India, it is recommended that this drug should be excluded from further trial. MEDICINE. Bark. 253

Food.—Dr. Brandis says that the young pods and seeds are eaten, and even the bark in times of scarcity is ground and mixed with flour. The latter is used to assist in preparing spirits from sugar and palm-juice, to precipitate, by the tannin which it contains, the albuminous substances in the juice and to facilitate the fermentation. It flavours at the same time the spirits, and is supposed to increase the amount of alcohol. "This fact was first ascertained and pointed out by **Mr. Broughton**, the Quinologist on the Nilgiris." (*Deputy Surgeon-General G. Bidie, M.B., C.I.E., Madras.*) The fruit is largely collected for fodder in the Panjáb. FOOD. Bark. 254 Spirits 255 FODDER. Fruit. 256

§ "In the South Mahratta Country the bark is used in the distillation of a spirit, in consequence of which the trees are farmed on account of Government." (*Surgeon-Major W. Dymock.*)

"The legumes are called *Padiá,* which are pickled in Kathiawar." (*Asst. Surgeon Sakharam Arjun Ravat, L.M., Girgaum, Bombay.*)

Structure of the Wood.—Sapwood large; heartwood reddish brown, with lighter and darker streaks; extremely hard. It seasons well and takes a good polish; is strong and tough, but often eaten by insects. It is brittle, makes good posts, but bad planks. (*Bomb. Gaz., XII., 25.*) It makes an excellent fuel. When seasoned a cubic foot weighs about 55 lbs. (*Bomb. Gaz., XV., Part I., p. 60.*) TIMBER. 257

Acacia megaladena, *Desv.;* Syn. for A. pennata, *Willd.*

A. melanoxylon, *R. Br.* 258

THE AUSTRALIAN BLACK-WOOD.

References.—*Benth., Fl. Aust., II., 415; Mueller's Select Extra-Tropical Plants, 6; Brandis, For. Fl., 180; Gamble's Man. Timb., 155; Kew Museum Cat., p. 56.*

Habitat.—A large tree met with in New South Wales, Victoria, Tasmania, and South Australia; introduced on the Nilgiris since 1840 and now completely naturalised. Also being grown in the hills of the Panjáb, Kumaon, and Sikkim.

Botanic Diagnosis.—*Leaves* seen only in young trees and then bipinnate, generally abortive, and represented by phyllodia. *Flowers* in globose, compact heads, on short axillary racemes.

Properties and Uses—

Structure of the Wood.—Hard and durable; heartwood dark-brown, beautifully mottled, soft, shining, and even-grained. Weight 41 to 48 lbs. per cubic foot in Australia; 36 lbs. on the Nilgiris. TIMBER. 259

It is used in Australia for cabinet-work, coach-building, railway carriages, and agricultural implements; on the Nilgiris chiefly for firewood. Regarded as one of the best Australian woods, being easily cut into veneers. "It takes a fine polish, and is considered as almost equal to walnut." (*Mueller.*) 260

A. modesta, *Wall.; Fl. Br. Ind., II., 296.* 261

Syn.—MIMOSA DUMOSA, *Roxb., Fl. Ind., II., 559,* and probably M. OBOVATA, *l.c., 561.*

Vern.—*Kántosariyo,* GUJ.; *Palosa,* AFG.; *Phulahi,* PB.

References.—*Brandis, For. Fl., 185; Gamble, Man. Timb., 152; Roxb., Fl. Ind., Ed. C.B.C., 646; Atkinson, Gums and Gum-resins, p. 8.*

Habitat.—Found in the Suliman and Salt ranges, Sub-Himálayan

tract between the Indus and the Sutlej, and in the northern part of the Panjáb plains. It is in fact one of the characteristic trees of the Panjáb.

Botanic Diagnosis.—A moderate-sized tree; *spines* in pairs, short hooked. *Leaves* with 4-6 pinnæ and 6-8 leaflets. *Flowers* in peduncled spikes 2-3 inches long, not very dense. *Corolla* greenish coloured, $\frac{1}{12}$ inch long, twice the length of the glabrous campanulate *calyx*. *Pod* 2-3 inches long by $\frac{3}{8}$, glabrous, glossy, venulose, straight strap-shaped, narrowed into a short peduncle.

Compare with **A. Catechu.**

Properties and Uses—

GUM. 262 **Gum.**—It yields a gum which occurs in the form of small, round, smooth, subtranslucent and very characteristic tears. I found what appeared to be this gum being used by the Lucknow calico-printers under the name of *bábúl*. It is quite tasteless.

MEDICINE. The Gum. 263 **Medicine.**—The gum, which is used in native medicine, is stated by **Bellew** to be regarded by the people of the Peshâwar valley as restorative.

FODDER. The Leaves. 264 **Fodder.**—The leaves and fallen blossoms are collected for cattle fodder.

TIMBER. 265 **Structure of the Wood.**—Sapwood large, white, perishable; heartwood dark brown, with black streaks, extremely hard—harder than that of **A. Catechu.** A most beautiful wood, strong and durable. Weight about 70 lbs. (In *Bomb., Gaz. VII., p, 31*, it is stated to weigh only 53-56 lbs.)

Valuable for cart-wheels, sugarcane-crushers, Persian water-wheels, and agricultural implements.

DOMESTIC. Tooth-brushes. 266 **Domestic Uses.**—§ "The delicate green twigs are used by the natives of the Panjáb in the form of tooth-brushes. The bark, though slightly unpleasant at first, imparts subsequently a pleasant and sweet taste to the mouth." (*Asst. Surgeon Bhagwan Das, Rawal Pindi.*)

Acacia paludosa, *Miq.;* Syn. for **A. pennata,** *Willd.*

267 **A. pennata,** *Willd.; Fl. Br. Ind., II., 297; Bot. Mag., t. 3408.*

Syn.—MIMOSA PENNATA, *Roxb.;* M. TORA, *Roxb.;* ACACIA MEGALADENA, *Desv.;* A. PENNATA, *Dalz. & Gib.*

Vern.—*Agla, awal,* KUMAON; *Thembi,* MAR.; *Biswúl,* HIND.; *Kundaru,* KÓL.; *Arar,* KHARWAR; *Undaru,* SANTAL; *Gurwa,* MAL. (S. P.); *Arfu,* NEPAL; *Tol rik,* LEPCHA; *Súyit,* BURM.

References.—*Brandis, For. Fl., 189; Kurz, Burm. For. Fl., I., 424; Gamble, Man. Timb., 155.*

Habitat.—A large, climbing shrub, found in Oudh, Kumaon, Nepal, Eastern Bengal, Burma, and South India.

Botanic Diagnosis.—*Prickles* fewer and less hooked than in **A. concinna** and **A. Intsia.** *Leaves* with 16-30 pinnæ and 80-100 leaflets, rigidly coriaceous, very narrow, densely crowded. *Flowers* in heads forming panicles; *bracts* minute, lanceolate. *Corolla* $\frac{1}{12}$ inch, slightly exceeding the glabrous *calyx*. *Pod* dry, thin, glabrous, dehiscent; 6-8 inches by $\frac{3}{4}$ to $1\frac{1}{4}$, strap-shaped, distinctly stalked. There are three or four varieties of this species.

Compare with **A. concinna.**

Properties and Uses—

TIMBER. 268 **Structure of the Wood.**— Reddish, porous, moderately hard, with large vessels and numerous medullary rays. (*Gamble, List Darj.*) Weight 50 lbs. per cubic foot.

269 **A. planifrons,** *W.&A.; Fl. Br. Ind., II., 293; Roxb., Cor. Pl., t. 199.*

THE UMBRELLA THORN.

Vern.—*Salé, sal,* TEL.

References.—*Brandis, For. Fl., 575; Gamble, Man. Timb., 150.*
Habitat.—Western Peninsula.

Botanic Diagnosis.—A small, gregarious tree, with flat, umbrella-like spreading branches; *branches* glabrous, but with grey lenticular dots. *Leaves* with 10-16 pinnæ and 16-24 leaflets. *Flowers* in globular heads in clusters from the axils of branchlets. *Pod* glabrous, narrow, ligulate, turgid, with straight sutures, indehiscent; distinguished from **A. eburnea** by being shorter and crooked. Compare with **A. arabica.**

Properties and Uses—

Structure of the Wood.—Hard and strong; heartwood red, sapwood white. TIMBER. 270

Used for agricultural implements and as fuel.

Acacia pycnantha, *Bth.* 271

THE GOLDEN OR GREEN WATTLE.

Habitat.—Victoria and South Australia.

"This tree, which attains a maximum height of about 30 feet, is second perhaps only to **A. decurrens** in importance for its yield of tanner's bark; the quality of the latter is even sometimes superior to that of the *Black wattle*, but its yield is less, as the tree is smaller and the bark thinner. TAN. Bark. 272 It is of rapid growth, content almost with any soil, but is generally found in poor, sandy ground, near the sea-coast, and thus is also important for binding rolling sand. Experiments instituted by me have proved the artificially dried bark to contain from 30 to 45 per cent. tanning principle, full-grown sound trees supplying the best quality. The aqueous infusion of the bark can be reduced by boiling to a dry extract which, in medicinal and other respects, is equal to the best Indian Catechu, as derived from **Acacia Catechu** and **A. Suma.** It yields about 30 per cent., about half of which or more is Mimosa-tannic acid. This Catechu is also of great use for preserving against decay articles subject to exposure in water, such as ropes, nets, fishing-lines, &c." "**A. pycnantha** is also important for its copious yield of gum." "The wood, though not of large dimensions, is well adapted for staves, handles of various instruments, and articles of turnery, especially bobbins." (*Baron von Mueller, Extra-Tropical Plants.*) It is remarkable that the Catechu-like products of Australia are all apparently made from a decoction of the bark instead of the heartwood, while in India the bark is rejected. It is probable that a combination of both practices would be more remunerative.

A. rupestris, *Stocks,* is by *Fl. Br. Ind.* reduced to **A. Senegal,** *Willd.*, which see.

A. Senegal, *Willd.; Fl. Br. Ind., II., 295.* 273

Syn.—A. RUPESTRIS, *Stocks,* as in *Brandis, For. Fl., 185;* A. VEREK, *Guill. et Perrot;* MIMOSA SENEGAL, *Linn.;* M. SENEGALENSIS, *Lam.*

Vern.—*Khor,* SIND; *Kúmta,* RAJ.; *Verek,* in WEST, and *Hashab* in EAST AFRICA.

References.—*Brandis, For. Fl., 185; Rájputana Gazetteer, 29; Flück. and Hanb. Pharmacog., 1879, 233.*

Habitat.—Chiefly found in Sind and Ajmere; abundant in West Africa, north of the River Senegal. It is also found in South Nubia, Kordofan, and in the region of Atbura in East Africa.

Botanic Diagnosis.—A low tree with grey bark, flexuose and glucose branches; *spines* strong, short, sharp-hooked, often 3-nate, two lateral and one below the petiole. *Leaves* with 6-10 pinnæ and 16-28 small ligulate leaflets and finely downy raches about one inch long, with a gland at the

ACACIA **Senegal.**

The True Gum Arabic.

base and between the upper pair of pinnæ. *Flowers* in peduncled spikes; *spikes* 2-3 inches long and not crowded. *Corolla* yellow, twice the length of the campanulate, glabrous, deeply-toothed *calyx*. *Pod* 3 by ¾ inch, thin, grey, indehiscent, straight, strap-shaped, with a strong, fibrous, marginal midrib, and constricted between the seeds.

Compare with **A. Catechu.**

THE COMMERCIAL GUM ARABIC.

GUM. 274 In Sind and Rájputana the gum from this tree is collected, but unfortunately it is sold in a mixed condition with the gums from other species of **Acacia.** This fact, in all probability, accounts for its superiority not having been recognised by the natives of India. It would be exceedingly interesting to have the gum carefully collected from Indian trees and chemically examined along with authentic samples from the African plant. The gum from the same species apparently varies considerably under diversified climatic conditions, for from Africa widely different gums are exported to Europe, and these meet the demands of distinct markets, but are apparently obtained from one and the same plant. **Flückiger** and **Hanbury** describe five or six African gums as regularly imported into Europe, of which the gum from **A. Senegal** is the most frequent, abundant, and valuable constituent.

Senegal Gum. 275 *1st.*—**Gum Senegal, or the Gum of A. Senegal,** the *Verek* of the Negroes.—To the French colony of Senegal (on the west coast of Africa) this is a most important product. The trade was first established by the Dutch and Portuguese, but the French afterwards monopolised it, and planted the colony of Senegal, having St. Louis and Portendic as the chief ports for the exportation of the gum. The tree from which this gum is obtained was first accurately described by **Adanson** in 1788. It is collected by the Moors after the close of the rains in November (when the wind sets in from the desert) up till July. The gum is found to exude in greatest abundance during the dry desert winds, and most frequently at the bifurcations of the branches. **Mr. M. C. Martius** has also observed that the production of the gum is stimulated by the growth of the parasite **Loranthus senegalensis.** The principal supply is to the north of the River Senegal, or about 16° N. latitude. The gum is shipped chiefly to Bordeaux, the quantity annually imported into France being from 1¼ to 5 millions of kilogrammes. It is usually of a yellowish to reddish colour, occurring in larger lumps than Turkey gum, roundish or oval, or even elongated, pulverisable, and less brittle than Turkey gum. It is not very much used in England, and may be distinguished from Turkey or Kordofan gum by the absence of the numerous fissures so characteristic of the latter, the masses being in consequence firmer and less easily broken.

Turkey Gum. 276 *2nd.*—**Kordofan or Turkey Gum.**—This is also ascertained to be a pure form of the gum from **A. Senegal,** the *Hashab* of East-Central Africa. It comes from the mountainous tracts of Kordofan on the Upper Nile (between Nubia and Sennaár) and almost in the same latitude as Senegal, although across the vast continent of Africa to the north-eastern division. It is calculated that about 30,000 cwts. of this gum are annually collected in Kordofan. The most valuable kind of Kordofan gum comes from the province of Dejara and is known as *Hashabi*. This is generally conveyed down the Nile to Egypt and thence exported to Europe. It occurs in rounded lumps, often as large as a walnut, or in irregular broken pieces, pure white, very much fissured, specially upon the surface. This is the gum most frequently used for medicinal purposes, and may, in fact, be regarded as the true officinal Gum Arabic of England, India, and America. It is in fact the only gum which should be used for medicinal purposes. It

The True Gum Arabic.

is chiefly imported into Europe from Alexandria and the neighbouring ports, hence the commercial name Turkey gum.

3rd.—**Suakim Gum.**—There are, in addition to the above, several inferior forms of gum obtained from North-East-Central, and North-East Africa, exported from Alexandria, and occasionally met with in the London marts. Amongst these may be mentioned the Sennaár gum known as *Hashab-el-Jesire;* the gum from the eastern territories of the Blue Nile and from the mountain tracts between Khartoum and Berber. From being exported from Suakim to Alexandria these are collectively known as Suakim gum, Talca or Talka gum. Suakim Gum is supposed to be obtained from **A. Seyal,** *var.* **fistula,** and **A. stenocarpa.** It generally exists in the form of a powder or in a semi-pulverulent state, owing to its being very brittle. It is a very inferior variety of gum. **Suakim Gum. 277**

4th.—**Barbary or Morocco or Mogador Gum.**—This brown-coloured gum is obtained from Morocco and the northern provinces, or brought to Mogador from Fezzan, or by caravans from Timbuctu. It is now pretty well determined to be the produce of **A. arabica,** *Willd.* (**A. Nilotica,** *Desf.*). The tree is said to bear the vernacular name of *attaleh,* and the gum is reported to be collected when the weather is hot and dry (July and August). It has a faint smell, and, when fresh, constantly produces a crackling noise. It is usually of a brownish colour and found in small angular or broken pieces. **Barbary Gum. 278**

5th.—**East Indian Gum.**—This is perhaps the most abundant gum in England and America, and is applied to industrial purposes. It is generally a mixture of gums, and chiefly from the following species: **A. Senegal,** *Willd.*, **A. stenocarpa,** *Hochst.*, **A. fistula,** *Schweinf.*, and **A. arabica,** *Willd.* (=**A. Nilotica,** *Desf.*). It is imported into Bombay from the Red Sea ports, from Aden, and the east coast of Africa. It is re-exported to Europe from Bombay under the name of Indian or East Indian gum. **Dr. Dymock,** speaking of Bombay, says there are "two kinds met with in this market, *viz.*, '*maklai,*' in large, round tears or vermicular pieces, white, yellow or reddish, much like gum Senegal, but more fissured (it derives its name from Makalla); and '*maswai,*' in angular fragments and vermicular pieces, fissured, white, yellow, or reddish, which derives its name from the port of Massowa. Both of these are good, soluble gums, and if carefully sorted not much inferior to Kordofan gum." In the year 1872-73, Bombay imported 14,352 cwt. of East Indian gum valued at R2,29,627, and re-exported 4,625 cwt. valued at R78,898. Ten years later the imports into Bombay were only 8,691 cwt. valued at R1,13,028. **East Indian Gum. 279**

6th.—**Cape Gum.**—This is produced at the Cape Colony from **A. horrida,** *Willd.*, the *Dúrnbúm* . or *Witledúrn* of the Colonists—the commonest tree of South Africa. The gum is pale yellow or amber-brown, and is regarded as inferior. **Cape Gum. 280**

7th—**Australian Gum or Wattle Gum.**—This is chiefly derived from **A. pycnantha,** *Benth.*, and **A. decurrens,** *Willd.* It occurs in hard, elongated, or globular pieces, varying in colour from dark amber to pale yellow. It is very adhesive and is said not to be liable to crack. The bark is very astringent, and seems to impart this property to the gum. **Wattle Gum. 281**

From the preceding sketch of the commercial substances known as gum arabic, it will be seen that they vary very much, but that the Kordofan form of the gum from **A. Senegal** is the purest and most valuable, and is the Gum Arabic of Pharmacy.

HISTORY OF GUM ARABIC. **282**

Gum arabic would appear not to have been known to the Sanskrit authors. The Persian and Arabic writers describe it under the name of *Samgh-i-arabi* (*Dymock*). From the very remotest antiquity gum was

The True Gum Arabic.

known to the Egyptians. It is frequently mentioned by the ancient writers, and there are numerous representations both of the plant and of the gum itself. The Egyptian fleet brought gum from Aden in the early part of the 17th century B.C. The word *Kami* is the original of the Greek Κόμμι, whence, through the Latin *gummi*, the English word gum was derived. (*Flück. and Hanb., Pharmacog.*) Gum was used by the Arabian physicians, but in the 12th century it was apparently unknown in Europe; it first reached Europe in 1340 A.D., through Italian merchants trading with Egypt and Turkey, and by the Portuguese in 1449 it became a regular article of trade from the west coast of Africa.

283 CHEMICAL COMPOSITION.

Important Characters.—§ "Gum Acacia or *Arabic* is a type of gum found in the juice of various plants, and especially in the genus ACACIA. Chemically gum Acacia consists of *Arabic Acid* (C_{12} H_{22} O_{11}) in combination with lime, potash, and magnesia. By the action of dilute sulphuric acid *Arabin* is converted into *Arabinose*, a crystalline principle, which is sweet, and which has the same composition as grape-sugar. By the action of dilute nitric acid, mucic acid and saccharic acids are obtained. Gum arabic is soluble in water but insoluble in alcohol. Another variety of gum is known of which gum tragacanth may be mentioned as a type, which does not dissolve in water, but merely swells up to a soft gelatinous mass. Gums of this latter class contain a principle named *Bassorin* or *Tragacanthine*. Gums sometimes resemble resins physically, but are distinguished by dissolving or softening in water, and by being insoluble in alcohol, while resins are unaffected by cold water but are more or less completely soluble in alcohol." (*Surgeon C. J. H. Warden, Prof. of Chemistry, Calcutta.*)

Gum dissolves slowly in an equal weight of water, without affecting the thermometer, and forms a thick glutinous liquid which possesses a distinctly acid reaction. This property is but slightly accelerated at higher temperatures. Gum is insoluble in alcohol and most other liquids. An aqueous solution of gum, if poured into glycerine, becomes intimately mixed, and this mixture may be evaporated to a thick jelly without any separation taking place. Dry lumps of gum are, however, insoluble in glycerine. Gum undergoes no change by age if kept dry, but if prepared with warm water its disposition to sour is increased. The solution does not, however, ferment upon the addition of yeast, but chalk and cheese start in it a fermentation which gives origin to lactic acid and alcohol, but not to mannite or glycerine.

Arabic Acid. 284 To separate *Arabic Acid* or *Arabin*, acidulate slightly a solution of gum with hydrochloric acid, and add alcohol, when the Arabin will be precipitated. Calcium chloride, upon a dialyser, will also separate this substance from the acidulated solution. An Arabin solution differs from a solution of gum in not being precipitated by alcohol, but if the Arabin precipitate obtained from the acidulated solution be removed by means of a filter and dried, it will be found that it has lost its solubility and cannot be dissolved even in boiling water. It has by the action of heat been changed into metagummic acid, a substance identical with *Cerasin* found in beet and in cherry gum, or in the series of the Tragacanth or Bassora gums.

Upon a chemical examination of the different kinds of commercial gum, **Masing** found that their botanical sources could not by that means be ascertained. He also observed that the value of a gum is better judged of from its solubility than from its colour. He noted that the percentage of ash varied but little, while the degree of alkalinity varied considerably, being

Alkalis of Gum. 285 chiefly due to lime. **Fremy** first called the attention of chemists to the

Chemical Composition.

peculiar relation between the organic substance of a gum and its mineral ash. The importance of his investigations lay in their physiological bearings upon the relation of the gum to the plant itself. If Arabin, which has by heat been rendered insoluble (converted into metagummic acid), be next subjected to the influence of an alkali, it is at once converted into a soluble gummy substance, which differs in no essential from natural gum. It is thus concluded that gum is a salt of lime, with Arabic acid or a mixture of such alkaline salts—magnesia and potash being frequently found in gum ash in addition to lime. Gum is thus viewed as a salt containing an overwhelmingly larger proportion of the organic acid than of the alkaline base, since 3 per cent. is about the largest proportion of lime detected. Although small, the percentage of alkali is, however, exceedingly constant—a fact which would seem to justify **Fremy's** conclusion that the formation of gum by the plant depends upon an important function, and is not accidental, the product eliminated being most probably the organic acid, which, on escaping from the structure of the plant, obtains its alkalis from the cell wall, and is thus reduced to the saline condition.

Dr. Graeger found that gum dried in the air contains 85·25 per cent. of organic matter, 3·15 of ash, and 11·60 of water. The ash was found in three experiments to contain the average of 48 per cent. of lime, 18 of magnesia, and 34 of potash. It still remains to be explained why the Bassora group of gums merely swell, when placed in water, instead of being dissolved. Ash of Gum. 286

Detection of Gum.—" Neutral acetate of lead does not precipitate gum arabic mucilage; but the basic or sub-acetate forms, even in a very dilute solution, a precipitate of definite constitution." (*Flück. and Hanb. Pharmacog.*) A gum solution is rendered turbid by silicates, borates, and ferric salts, but it is unaffected by silver salts, mercuric chloride, and iodine. Acted upon by nitric acid, mucic acid is produced from gum, and also a little oxalic acid.

Kiliani has recently shown that *Arabinose*, the sweet substance obtained from gum arabic by the prolonged action of dilute sulphuric acid, is identical with lactose obtained from milk sugar. Gum may be distinguished from dextrine by the following tests:—

1st.—It contains no dextro-glucose, a substance present in dextrine and recognised by the copper test (Fehling's solution).

2nd.—Gum contains a lime compound detected by the milky action of oxalic acid.

3rd.—Gum gives a yellow precipitate with ferric salts.

Substitutes and Adulterations.—The *Indian Pharmacopœia* recommends the gum of **Feronia Elephantum**, *Corr.*, as a good substitute. It forms small rounded tears, transparent, frequently stalactitic, colourless, yellow, or reddish. It is soluble in two parts of water, forming a tasteless mucilage and much stronger than a gum arabic solution of the same proportions. It is chemically, however, considerably different from true gum arabic. It is precipitated by neutral acetate of lead or caustic baryta, but not by potash; in this reaction it resembles Tragacanth, which, unlike gum arabic, yields an abundant precipitate with neutral acetate of lead. 287

The gum from **Prosopis glandulosa**, *Torrey*, a tree successfully introduced into the North-West Provinces by the Department of Agriculture and Commerce (nearly allied to the Panjáb species, **P. spicigera**, *Linn.*), " yields a gum sometimes used in America as a substitute for gum arabic, and known there as Mezquit Gum." (*Dr. Charles Rice, New York.*) 288

The adulterations are chiefly mixtures of other less valuable gums, and, indeed, so frequently is this the case that for pharmaceutical purposes it is desirable that the gum should be picked and assorted and

each fragment cleansed from mechanical impurities. Flour or starch is often mixed with powdered gums, but this may readily be detected by the blue reaction with iodine. *Dextrin* is also often used as an adulterant, but this may be at once detected by the tests already given. Sand and other non-gummy substances are sometimes mixed to increase the weight, taking advantage of the presumption that these will be viewed as mechanical and accidental.

THE DYE.

DYE. Gum. 289 Large quantities of gum arabic are used for giving lustre to crape and silk, and for thickening colours and mordants in calico-printing; for suspending tannate of iron in the manufacture of ink and blacking.

MEDICINAL USES.

MEDICINE. The Gum. 290 The gum is used in medicine as a demulcent and emollient. Taking advantage of its viscidity it is used *externally* to cover inflamed surfaces, such as burns, sore nipples, &c., and it blunts the acrimony of irritating matters by being blended with them. The powdered gum has also been found useful in checking hæmorrhage from leech-bites, and when blown up the nostrils it arrests severe epistaxis. *Internally* it has been found useful in inflammations of the gastric and intestinal mucous membrane. If held in the mouth in the form of a special preparation, the gum is found serviceable in allaying cough, thus affording relief. Its influence as a demulcent is supposed to extend even to the urinary organs. Gum has also been recommended as a substitute for amylaceous food in diabetes, since it is not converted into sugar, but it does not appear to have been attended with any appreciable benefit.

Acacia sirissa, *Buch.;* Syn. for **Albizzia Lebbek,** *Benth.*

A. speciosa, *Willd.;* Syn. for **Albizzia Lebbek,** *Benth.*

291 **A. Suma,** *Kurz, Mss. in Brandis' For. Fl., 187; Fl. Br. Ind., II., 294; Bedd., Fl. Sylv., t. 49.*

Syn.—MIMOSA SUMA, *Roxb.*

Vern.—*Sai-kanta,* BENG.; *Kumtia,* PERTABGARH; *Dhaula khejra* (White Acacia), BANSWARA; *Gorado,* MANDEVI; *Sonkairi,* DANGS; *Tella sandra,* TEL.; *Mugalisoppu* (IN MYSORE), *banni mara, mugli,* KAN.

Habitat.—Common in Bengal, Behar, the Western Peninsula, Ava, and Ceylon.

Botanic Diagnosis.—A medium-sized tree, with *white bark* and downy branchlets; *spines* in pairs, short-hooked. *Leaves* with 20-40 pinnæ and 60 to 100 leaflets; *rachis* $\frac{1}{3}$ feet long, densely downy, with a large basal gland and several glands between the upper pinnæ. *Corolla* nearly white, scarcely exceeding the canescent *calyx. Pod* 3-4 inches by $\frac{1}{3}$ to $\frac{3}{4}$ inch, thicker than in **A. Catechu**; veined, distinctly beaked, strap-shaped, narrowed suddenly into a stalk $\frac{1}{3}$ to $\frac{3}{4}$ inch long.

Compare with **A. Catechu.**

CATECHU. 292 **Gum.**—The extract Catechu is said to be made from the heartwood of this tree (*Brandis, 188*).

TAN. The Bark. 293 **Tan.**—The bark is peeled off and used as a tan (*Brandis*).

TIMBER. 294 **Structure of the Wood.**—The wood resembles that of **Acacia Catechu,** but has smaller and more numerous pores, and finer and more numerous medullary lays.

295 **A. Sundra,** *DC.; Fl. Br. Ind., II., 295; Bedd., Fl. Sylv., t. 50.*

Vern.—*Lál khair,* MAR.; *Kempu khairada, shemi,* KAN.; *Nalla sandra, sandra, darisanchai,* TEL.; *Karangalli, búga,* TAM.; *Banni* (IN MYSORE), KAN.

Habitat.—Found in the Western Peninsula, Ceylon, and Upper Burma.

Botanic Diagnosis.—The *Flora of British India* remarks: "This is scarcely more than a variety of **A. Catechu,** from which it differs by its fewer leaflets and pinnæ, and by the total absence of pubescence," and in "the dark-brown colour of its branchlets."

Compare with **A. Catechu.**

Properties and Uses.—

Gum.—It yields Catechu of good quality. CATECHU. 296

Structure of the Wood.—Dark red, rather close grained, durable, very heavy, not attacked by insects. Much like **A. Catechu,** and when seasoned weighs about 80 lbs. per cubic foot. (*Bomb. Gaz., XV., Part 1., p. 60.*) TIMBER. 297

Cleghorn says it is "used for posts and rice-pestles. The supply is rather large and abundant, but the wood is not generally to be obtained in the market in planks of any size. At Guntur, **Mr. Rohde** states that posts 5 feet long are procurable at R12 per 100. These are well suited for fencing, though the non-elastic nature of the wood is unfavourable to the holding of nails driven into it. The natives regard it as the most durable wood for posts in house-building." (*Cleghorn's For. and Gard. S. Ind., 223.*) 298

Acacia tomentosa, *Willd.; Fl. Br. Ind., II., 294.* 299

Habitat.—A small tree of the Western Peninsula and Ceylon; very common in the Panch Mahâls and Gujarât, where it is known as *anjar.*

A. umbraculata, *Wall.;* Syn. for **A. Latronum,** *Willd.*

A. vera, *Willd.,* see **A. arabica,** *Willd.;* and for the true Gum Arabic, see **A. Senegal,** *Willd.* 300

A. vera may be described as the hypothetical species to which the true gum arabic was attributed before the plants which yielded that product were definitely determined.

ACALYPHA, *Linn.; Gen. Pl., III., 311.* 301

A genus of shrubs (belonging to the Natural Order EUPHORBIACEÆ) having alternate, ovate, 3-5 or pinnivened *leaves,* with long petioles; often in cultivation variously coloured or marked, chiefly in shades of yellow to dark red. *Flowers* in axillary simple racemes or spikes, apetalous and monœcious or diœcious. *Male calyx* usually 4-partite, valvate. *Stamens* indefinite (rarely 8), attached to an elevated receptacle; *filaments* free, compressed, attenuate at the apex; *anthers* inserted below the apex, cells often free. *Female flowers* in spikes, hid within the axils of bracts, solitary or 2-3, cymose, sessile. *Bracts* much varied in form, usually dentate, variously evolute, and in most species accrescent, more or less covering the fruit. *Female calyx* 3-4-partite, subchavate. *Ovary* 3-locular, *cells* (two anterior) 1-ovuled. *Style* 3, distinct, or shortly connate at the base. *Capsules* 3, often echinate or rugose. (Compare with *Baillon, V., 212.*)

A large genus, comprising some 220 species, mostly American, but more or less distributed over all tropical and sub-tropical countries. In India there are some six or eight unimportant species. The name of the genus was originally *Acalépha,* from ἀκαλος, unpleasant; and ἡφη, touch, or ἀκαλήφη, the nettle.

Acalypha brachystachya, *Horn, Hort.; DC. Prod., XV., II., 870.* 302

Syn.—A. CONFERTA, *Roxb.; Fl. Ind., Ed. C.B.C., 686;* A. CALYCIFORMIS, *Wall. Cat.*

Habitat.—A small bush, little over a foot in height, met with on the Himálaya and the Nilgiri Hills.

Botanic Diagnosis.—*Leaves* round, cordate, long-petioled, three-nerved. *Spikes* sessile, aggregated together; *male flowers* minute, purplish, forming a head within the exterior involucre; *female flowers* two or three within each involucre. *Bracts* crowded, sessile, proliferous.

303 **Acalypha ciliata,** *Müll.-Arg.; DC. Prod., XV., II., 873; Roxb., Fl. Ind., Ed. C.B.C., 686.*

Habitat.—A common annual plant, throughout the plains of India, most plentiful in the Western Peninsula, where it almost takes the place of **A. indica,** *Linn.*, to which it is nearly allied.

304 **A. fruticosa,** *Forsk.; DC. Prod., XV., II., 822; Kurz, For. Burm., II., 397;* **A. amentacea,** *Roxb., Fl. Ind., Ed. C.B.C., 686;* **A. betulina,** *Retz.; Ainslie. Mat. Ind., II., 388; Drury, Us. Pl., 10.*

THE BIRCH-LEAVED ACALYPHA.

Vern.—*Sinni-marum,* TAM.; *Chinni-ká-jhar,* DUK.; *Chinni-áka, chinni,* TEL.

Habitat.—A bush, 4-8 feet high, leaf-shedding; met with in South India—Madras, Pondicherry, Mysore, and the Carnatic; Ceylon; Burma—frequent in the tropical forests of Pegu Yomah and Martaban up to 2,000 feet in altitude; Moluccas.

Botanic Diagnosis.—*Leaves* ovate-oblong, deeply serrate, acute to long acuminate, 3-or almost 5-nerved, tomentose beneath, on a long petiole. *Flowers* minute, green, clustered, sessile, forming slender puberulous spikes, occurring singly or 2-3 above the scars of fallen leaves; the *female flowers* at the very base of the spike or on separate small axillary spikes. *Styles* simple, many-cleft, about 2-3 times longer than the floral bracts. Flowering time the beginning of the hot season.

MEDICINE. Leaves. 305

Medicinal Properties and Uses.—The LEAVES "are much esteemed by the native practitioners, who prescribe them as a grateful stomachic in dyspeptic affections and in cholera; they are, besides, considered as attenuant and alterative, and are accordingly administered when it is necessary to correct the habit." "The dose of the infusion of the leaves" as ordered by the *Vytians,* "is half a tea-cupful twice in the day." (*Ainslie, Mat. Ind., II., 388.*)

306 **A. indica,** *Linn.*

Syn.—A. SPICATA, *Forsk.;* A. CILIATA, *Wall. Cat., No. 7779;* and A. CANESCENS, *Wall. Cat., No. 7785.*

Vern.—*Kuppi, khokali,* or *khokli,* HIND., BOMB.; *Khokli, khájoti,* MAR.; *Vanchhi kánto,* GUJ.; *Muktajuri, shwet busunta, murkanta,* BENG.; *Indra-maris,* URIYA; *Arittamunjayrie?* SANS.; *Kuppaimeni,* TAM; *Kuppai-chettu, murkanda-chettu* or *múrúkonda* (GODAVARI), *pappanti, marupindi, harita-manjiri,* TEL.; *Chalmari, küppi,* KANARA; The *Cupameni* of Rheed, Mal., X., 161, t. 81, 83; *Kúpamenya,* CINGH.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 685; DC. Prod., XV., II., 868; Pharm. Ind., 205; Ainslie, Mat. Ind., II., 161; O'Shaugh. Disp., 562; Balf. Cycl., I., 19; Bidie, Cat. Paris Exh., 1878, 42; Dymock, Mat. Med. W. Ind., 587.*

Habitat.—A small annual shrub (1-2 feet in height) occurring as a troublesome weed in gardens and road-sides throughout the plains of India, flowering all the year.

Botanic Diagnosis.—*Leaves* scattered, ovate-cordate, 3-nerved, serrate, smooth, about 2 inches long and 1½ broad; *petiole* as long as the blade. *Spikes* axillary, generally single, peduncled, erect, as long as the leaves, many-flowered, crowned by a cross-shaped body, the base of which is surrounded with a three-leaved *calyx.* From the base of this cross-

is given to children as an emetic in ʒss to ʒi doses." (*Apothecary J. Norman, Chattrapur, Ganjam.*)

312 "This plant is called in Kanara *chalmarí* as well as *kúppí* (the latter word means a 'heap,' the plant being found in waste places and rubbish heaps). The natives use it in congestive headaches: a piece of cotton is saturated with the expressed juice and inserted into each nostril, relieving the head symptoms by causing hæmorrhage from the nose. The powder of the dry leaves is used in bed sores and wounds attacked by worms. In asthma and bronchitis I have employed it with benefit both in children and adults.

313 "**Mode of preparation.**—Macerate 3 oz. of the fresh leaves, stalks, and flowers, with a pint of spirits of wine, in a closed jar for 7 days, occasionally agitating the same. Strain, press, filter, and add sufficient spirits of ether to make one pint.

314 "**Physiological effects.**—In small doses it is expectorant and nauseant; in large doses emetic.

315 "**Dose.**—Minims 20 to 60, frequently repeated during the day in honey." (*Surgeon-Major E. H. R. Langley, Bombay.*) "One drachm of the expressed juice of the fresh leaves is an easy and rapid emetic in children. The bruised leaves are useful as an application to maggot-eaten sores." (*Surgeon W. D. Stewart, Cuttack.*)

316 "The root, bruised in hot water, is employed as a cathartic, and the leaves as a laxative in decoction mixed with common salt. The leaves are used in scabies, and mixed with chunam in other cutaneous diseases (*Drury*)." (*Surgeon H. W. Hill, Mánbhúm.*)

ACAMPE, *Lindl.; Gen. Pl., III., 579.*

317 Acampe papillosa, *Lindl.*; Orchideæ.

Syn.—Saccolabium papillosum, *Lindl.*

Vern.—*Kánbher,* Mar.; *Rásná, gandhanákuli,* Sans. The Drug, *Rásná,* Hind., Beng., Bomb.

MEDICINE. 318 **Medicine.**—This plant is said by **U. C. Dutt** to be used indiscriminately with the **Vanda Roxburghii**, the roots of both constituting *rásná*, Beng. and Sans., also *gandhanakulí*. **Acampe** is a native of the coast of Burma and South India, and is not met with in Bengal.

Acampe differs from **Vanda** in having small brittle flowers, with a lip adnate to the edges of the column, sepals and petals thick, concave; racemes short, rigid, crowded upon a short simple peduncle. **Dr. Dymock** includes both the above plants as yielding the *rásná*, and says the bazar drug comes from Kathiawar. The comparatively limited distribution of **A. papillosa** as compared with **Vanda Roxburghii** should assist in determining which of these plants is the true *rásná*.

It seems probable that the roots of two or three distinct orchids are indiscriminately used as *rásná*,—*i.e.*, **Acampe papillosa, Vanda Roxburghii**, and **Vanda Wightiana**. **U. C. Dutt** gives as follows a popular prescription for rheumatism, in which *rásná* is one of the ingredients:—

319 "*Rásná-panchaka.*—Take of *rásná, gulancha, devdáru*, ginger, and the root of the castor-oil plant in equal parts, and prepare a decoction in the usual way. This is apparently a popular prescription for rheumatism, being mentioned by most writers."

320 § **Special Opinions.**—"This orchid is very common in the Konkan; its roots are considered to have cooling properties, and are used medicinally as *Rásná*." (*Surgeon-Major W. Dymock, Bombay.*) "I found the **Acampe papillosa** in the mango-groves of Malda. It is a common parasite on the mango tree, and flowers in the rainy season, when it can readily be

distinguished from allied species." (*U. C. Dutt, Civil Medical Officer, Serampore.*)

"It is said to be a specific for acute rheumatism. It is invariably given internally as a substitute for Sarsaparilla. There are three preparations in use. The first is called *Rásná panchak*, and is prepared by boiling together equal parts of *rásná*, *dewadára*, ginger, *garula* and castor root, and water 8 oz. This decoction is prescribed extensively for cases of acute rheumatism. The second preparation, or *Rásná suptaka*, has seven ingredients, and is given to cases of lumbago, sciatica, and neuralgia. Prepared by boiling together equal quantities of *rásná*, *gokharu*, castor root, *dewadára*, *poonarnawá*, *goilwel*, pulp of *babawa*, and ginger. The third preparation is named the great *Rásná* (*Bará rásná*) and is considered a specific remedy for rheumatic and nervous affections, paralysis, secondary syphilis, and uterine diseases. It has the peculiar power of preventing abortions and miscarriages. The ingredients of the decoction are *rásná* two parts, *dhumasa*, *chiknamula* one part, castor root one, *dewadára* one, *kuchora vekhanda* one, *adulasa* one, ginger one, small *hirda* one, *chuwak* one, *nagar-motha* one, *punarnawá gulawel* one, *wardhárá* one, *budishep* one, *gokhroo asandha* one, *ativish* one, pulp of *bahawa*, *sutawari* one, *pimplee* one, *kolista* one, coriander one, *ringnee* one, and *moti ringnee* one." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) 321

ACANTHACEÆ; *CXXII., Gen. Pl.* 322

The name of a large and important Natural Order of herbs and shrubs (rarely trees), comprising about 1,500 species, almost exclusively inhabitants of the tropical and warm-temperate regions of the Old World. Indeed, the gregarious, sub-bushy or herbaceous under-vegetation of damp tropical forests may be regarded as at least one-third composed of Acanthaceous plants. Over 400 species are met with in India, 154 of which, according to *Flora of British India*, are referred to the genus STROBILANTHES. Only a few species occur in the temperate zones and none in the alpine or arctic regions.

This Natural Order belongs to the Cohort PERSONALES or plants, having a monopetalous, hypogynous, and chiefly 2-labiate *corolla*; *stamens* generally 4, two long and two short (*didynamous*). *Ovary* 1-2, rarely 4-celled. *Fruit* capsular. In this cohort are placed the following Natural Orders: SCROPHULARINEÆ, VERBENACEÆ, LENTIBULARIEÆ, OROBANCHACEÆ, GESNERACEÆ, BIGNONIACEÆ, ACANTHACEÆ, and PEDALINEÆ.

Diagnostic characters of the Acanthaceæ.—*Leaves* opposite, exstipulate. *Flowers* aggregated into compact, bracteated *spikes* (sometimes solitary as in some THUNBERGIEÆ). *Corolla* imbricate or twisted in æstivation, bilabiate, rarely sub-regular. *Stamens* often reduced to two. *Ovary* 2-celled; *ovules* one or more in each cell, 1 to 2, seriate, anatropous. *Capsule* dehiscent, loculicidal; *valves* often elastically recurving and carrying the seeds attached to the septa. *Seeds* 2-seriate along the *septum*, and each (except in THUNBERGIA) seated upon a sharp, up-curved, hook-like process from the placenta (called the *retinacula*), ovoid or compressed; *testa* smooth or warted, rarely hispid. *Albumen* none.

This Order has its nearest affinities in SCROPHULARINEÆ, BIGNONIACEÆ, and VERBENACEÆ. The bracteated spike, contorted æstivation, and the presence of retinacula will unerringly separate it, however, from these Orders. Indeed, the dark-greenish blue, and more or less glabrous condition of the foliage, with many approximately parallel veins, when taken along with the bracteated spikes, will be found to possess something so characteristic and impressive, that if this feature be once carefully observed it is not again readily mistaken.

For the analysis and diagnostic characters of the genera and species of this Order reference should be made to the *Flora of British India, Vol. IV., 388*, from which the following classification into Tribes has been extracted for the convenience of the general reader:—

Tribe 1, Thunbergieæ.—Scandent or twining. *Calyx* minute, annular

or 10-15-toothed. *Corolla-lobes* twisted in bud. *Ovules* 2 in each cell, collateral, capsule beaked; retinacula 0.

Genus—Thunbergia.

Tribe 2, Nelsonieæ.—*Corolla-lobes* imbricate in bud. *Ovules* many, superimposed in two rows in each cell. *Seeds* small, seated on minute papillæ, not on hard retinacula, obscurely albuminous.

Genera.—Elytraria, Nelsonia, Ebermaiera, Ophiorrhiziphyllum.

Tribe 3, Ruellieæ.—*Corolla-lobes* twisted to the left in bud. Seeds on retinacula. *Sepals* 5 or 4, with one larger. *Anthers* usually 2-celled; *cells* parallel or one a little below the other. *Style* 2-fid, one lobe often suppressed.

Sub-tribe 1, POLYSPERMEÆ.—*Ovules* 3 to 12 in each cell. *Capsule* normally 6 or more seeded.

Genera.—Cardanthera, Hygrophila, Nomaphila, Ruellia, Echinacanthus, Æchmanthera, Hemigraphis, Stenosiphonium.

Sub-tribe 2, TETRASPERMEÆ.—*Ovule* 2 in each cell. *Capsule* 4 or fewer seeded.

Genera.—Strobilanthes, Calacanthus, Calophanes, Dædalacanthus, Phaylopsis, Petalidium.

Tribe 4, Acantheæ.—*Corolla-tube* short; upper lip obsolete, lower 3-lobed. *Ovules* 2 in each cell. *Retinacula* curved, hardened.

Genera.—Blepharis, Acanthus.

Tribe 5, Justicieæ.—*Corolla-lobes* imbricate in bud. *Retinacula* curved, hardened. *Anthers* 2-1-celled; cells often spurred at the base, one frequently placed much above the other. *Style* shortly equally 2-fid or sub-entire.

Sub-tribe 1, ANDROGRAPHIDEÆ.—*Ovules* 3-10 in each cell. *Capsule* normally 6 or more seeded.

Genera.—Andrographis, Haplanthus, Gymnostachyum, Phlogacanthus, Cystacanthus, Diotacanthus.

Sub-tribe 2, BARLERIEÆ.—*Ovules* 2-1 in each cell. *Corolla-lobes* 5, sub-equal. *Stamens* 4, of which 2 are small or obsolete, or 4-1-celled.

Genera.—Barleria, Neuracanthus, Crossandra.

Sub-tribe 3, ASYSTASIEÆ.—*Ovules* 2 in each cell. *Corolla-lobes* 5, sub-equal. *Sepals* 5, small, sub-equal. *Stamens* 4 or 2; anther-cells 2, sub-equal, parallel, muticous.

Genera.—Asystasia, Eranthemum, Codonacanthus.

Sub-tribe 4, EUJUSTICIEÆ.—*Ovules* 2 in each cell. *Corolla* distinctly 2-lipped.

Genera.—Lepidagathis, Phialacanthus, Monothecium, Clinacanthus, Hypœstes, Rungia, Dicliptera, Peristrophe, Justicia, Adhatoda, Rhinacanthus, Dianthera, Ptysiglottis, Sphinctacanthus, Ecbolium, Graptophyllum.

323 **ACANTHUS,** *Linn.; Gen. Pl., II., 1090.*

A genus of herbs belonging to the ACANTHACEÆ; characterised by having the upper lip of the *corolla* obsolete, lower 3-lobed. Anterior *filaments* without an excurrent process. *Ovules* 2 in each cell.

It contains 7 Indian species, none of which are of any great economic value; all are confined to the warm forests of the Eastern Peninsula. **A. spinosus** is found in Italy, Spain, and the south of France, and is supposed to have suggested the idea of the decoration of columns in the style now known as Corinthian architecture.

324 **Acanthus ilicifolius,** *Linn.; Fl. Br. Ind., IV., 481; Wight, Ic., t. 459.*

Vern.—*Harcuch kanta,* BENG.; *Harikusa,* SANS.; *Kaya,* BURM.

Habitat.—A common plant, growing everywhere near the coast, from

the Sunderbuns to Malacca, and one of the most characteristic plants in that region. It makes its appearance in the swamps around Calcutta, Dum-Dum, &c.

It does not appear to be put to any economic purpose, although it covers many miles of country.

ACER. 325

A genus of trees with opposite, simple, or palmately lobed, exstipulate *leaves* (belonging to the Natural Order SAPINDACEÆ). *Flowers* regular, polygamous, formed into terminal and lateral racemes or corymbs. *Calyx* usually 5-partite, imbricate, deciduous. *Petals* of the same number as the sepals, or absent, shortly clawed, and without scales. *Stamens* 4-12, usually 8, inserted on the glabrous disk; generally shorter in the hermaphrodite than in the male flowers. *Ovary* laterally compressed, 2- (rarely 3-) lobed and celled; cells 2-ovuled. *Fruit* an indehiscent double samara. *Seeds* exalbuminous.

A genus containing about 40 to 50 species, found in Europe, Asia, and North America, chiefly in the temperate zones. The name Acer is derived from the Latin *Acer*, sharp or pointed (aigu, *Fr.*; acute, eager, *Eng.*). A name applied in all probability by the Latin people to the members of this genus in allusion to the form of the leaves. This is the genus of the maple, the sycamore, and the plane-tree of English authors. **A. Pseudo-platanus** is a native of Germany, Switzerland, Austria, and Italy, now largely cultivated in England; it is the greater maple, sycamore, or plane-tree. **A. campestre** of England is the common maple. **A. saccharinum,** *Wang*, is the common sugar-maple of the Northern United States and of Canada. In addition to yielding sugar, **A. rubrum,** the Swamp maple of Pennsylvania, gives from its bark a dark-blue dye made into ink.

MAPLE-SUGAR (a form of Cane-sugar). 326

References.—*Spons' Encycl., 1902; Flück. and Hanb., Pharmacog., 721; Smith's Dictionary of Economic Plants; Smith on Foods, 256; U. S. Dispens., 15th Ed., 1256; Simmonds' Comm. Prod. Veg. Kingdom, p. 205.*

It would appear that either none of our Indian species of Acer yield maple-sugar, or that this property is quite unknown to the natives of our hill tracts, where various species of maple are plentiful. This subject seems worthy of a little attention, for there does not seem the slightest reason why the sugar-yielding species could not be introduced into India. If they were found to take naturally to the soil and climate of Indian subalpine regions, they might supply the poor hill tribes with the little-known luxury of sugar; they are, however, of no commercial value. Speaking of maple-sugar, *Spons' Encycl.* says: "In sections of the United States where it has not been exterminated, the manufacture of sugar and syrup from it is a remunerative adjunct to other farming industries, occupying a period in which little other farm work can be pursued. The apparatus for collecting the sap and manufacturing the sugar involves a very small investment; the fuel consumed usually consists of the prunings of the maple grove, which is benefited thereby; and at least 90 per cent. of the gross return is net profit."

The census of Pennsylvania for 1870 gives the following figures for maple-sugar as manufactured in that State: 1850, 2,326,525 lbs.; 1860, 2,768,965 lbs.; and in 1870, 1,545,917 lbs.; and the United States as a whole are said to manufacture about 40,000,000 lbs. annually, the Indians manufacturing some 30,000,000 lbs. in addition for their own consumption. Of this amount Vermont yields about 10,000,000 lbs. and New York

ACER cæsium.

The Species of Indian Maple.

a somewhat larger quantity. Canada manufactures about 10,000,000 lbs. annually.

In addition to the manufacture of sugar a large quantity of maple sap is consumed in the form of molasses.

327 In Nebraska an equally good saccharine product is obtained from **A. Negundo,** *L.* **(Negundo aceroides,** *Mœnch*). From some investigations made in Illinois, with reference to the value of this tree as a supply of sugar, it was found (1) that trees 5 years old commence to yield, and that an ordinary tree will yield more than one of equal size of the true maple-sugar tree; (2) that the sap is richer in sugar, the yield being 2·8 per cent. to the weight of sap; (3) that the sugar produced is whiter than that from the sugar-maple. These facts should recommend themselves to planters, and it is probable this tree would succeed better in India than any of the preceding species.

There are 13 species of Acer met with in India, grouped into the following sections by the *Flora of British India*:—

[*Note.*—Those marked * will be found described further on.]

Section I.—Leaves undivided.

† *Leaves with 3 basal nerves.*

* 1. **A. oblongum,** *Wall.*—Kashmír, Sikkim, Bhután.

2. **A. niveum,** *Blume.*—Leaves quite entire, white, glaucose beneath. *Cymes* lax, flowered, glabrous, *cell* not angular.—Assam, Moulmein, Sumatra.

* 3. **A. lævigatum,** *Wall.*—Simla, Sikkim, Khásia Hills, &c.

†† *Leaves with 5 basal nerves.*

* 4. **A. sikkimense,** *Miq.*—Sikkim, Bhután.

* 5. **A. Hookeri,** *Miq.*—Sikkim, Bhután.

6. **A. stachyophyllum,** *Hiern.*—*Leaves* serrate. *Carpels* 1¾ to 2 in. long. *Cells* angular.—Sikkim, Bhután.

Section II.—Leaves 3-lobed.

7. **A. isolobum,** *Kurz.*—*Leaves* deeply 3-lobed and nerved, glabrous, shining, acutely serrate, lobes lanceolate, acuminate,—Pegu.

8. **A. pentapomicum,** *J. L. Stewart.*—Leaves 3-lobed, with tufts of hairs in the axils of the 3-5 nerved lobes, ovate, obtusely serrate. Peduncles fascicled.—Kashmír to Kumaon.

Section III.—Leaves 5-lobed and nerved (except 3-lobed form, under **A. villosum var. Thomsoni.**)

* 9. **A. cæsium,** *Wall.*—Kashmír to Nepal.

* 10. **A. villosum,** *Wall.*—Kashmír to Nepal.

* **Var. Thomsoni,** *Miq., Sp.*—Bhután to Mánipur.

* 11. **A. caudatum,** *Wall.*—Chumba to Sikkim.

Section IV.—Leaves 7- to 5-lobed and nerved.

* 12. **A. Campbellii,** *Hook.*—Sikkim to Mánipur.

* 13. **A. pictum,** *Thunb.*—Kashmír to Bhután.

328 **Acer cæsium,** *Wall.; Fl. Br. Ind., I., 695;* Sapindaceæ.

The Indian Maple.

Vern.—*Trekhan, tarkhana, tilpattar, mandar, kauri, kalindra, salima, kansal,* Pb.; *Kanshin,* Thibet; *Jerimu, shumanjra,* Simla; *Kilu, kainshing,* Kumaon.

References.—*Brandis, For. Fl., 111; Gamble, Man. Timb., 100.*

Habitat.—A large, deciduous tree, found in the North-West Himálaya from the Indus to Nepal, between 7,000 and 11,000 feet.

Maple Timber. **ACER Hookeri.**

Botanic Diagnosis.—*Leaves* palmately 5-lobed, pale, glaucose beneath and almost quite glabrous, except a few short hairs on the veins. *Cymes* corymbose, appearing after the leaves and becoming nearly as long. *Fruit* black and quite glabrous, carpels 1¾ to 2 in. long, wings venose, somewhat diverging; cells angular, black.

A large tree, often 80 feet in height; twigs red or bluish, laterally compressed, flowering in April, and the fruit ripening in October.

Structure of the Wood.—White or pale cream-coloured, with brown bands, porous, close-grained, less mottled than that of **A. caudatum**, soft to moderately hard; annual rings distinct. Weight about 40 lbs. per cubic foot. TIMBER 329

Scarcely used. Drinking-cups are sometimes made of it by the Thibetans. DOMESTIC. 330

Acer Campbellii, *Hook. f. & Th.; Fl. Br. Ind., I., 696.* 331

Vern.—*Kabashi*, NEPAL; *Daom, yatli*, LEPCHA; *Kilok*, BHUTIA.
Reference.—*Gamble, Man. Timb., 100.*

Habitat.—A large deciduous tree, found in the Sikkim Himálaya, above 7,000 feet in altitude. This is the chief Maple of the North-East Himálaya.

Botanic Diagnosis.—*Leaves* beautifully green, 5-7-lobed, sub-membranous, glabrescent, except in the axils of the 5-7 nerves, petioles red. *Cymes* pyramidal or elongated, sub-glabrous, appearing with the leaves.

Structure of the Wood.—Greyish white, moderately hard, shining, close-grained. Annual rings marked by a thin line. Weight 38 lbs. per cubic foot. TIMBER. 332

It is extensively used for planking and for tea-boxes. It reproduces freely either by seed or by coppice, and plays an important part in the regeneration of the hill forests. 333

A. caudatum, *Wall.; Fl. Br. Ind., I., 695.* 334

Vern.—*Kansla, kandaru, kanjara*, SIMLA; *Khansing, kabashi*, NEPAL; *Yalishin*, BHUTIA.
References.—*Brandis, For. Fl., 112; Gamble, Man. Timb., 100.*

Habitat.—A moderate-sized, deciduous tree, with dark-brown bark, flowering in March and April; met with in the Himálaya from the Chenab to Bhután, between 7,000 to 11,000 feet.

Botanic Diagnosis.—*Leaves* 5-lobed, serrate, nearly glabrescent except in the axils of the nerves; *lobes* caudate, the two basal ones small. *Racemes* short. *Carpels* ¾ to 1¼ inch long. *Fruit* nearly glabrous; *wings* pink, or at length ferruginous, *front* sinuous, crenulate.

Structure of the Wood.—White, with a faint pink tinge, shiny, compact, moderately hard, sometimes with small masses of heartwood near the centre. Annual rings distinct. Weight 43 lbs. per cubic foot. TIMBER. 335

A. cultratum, *Wall.*

A Synonym used by *Baden Powell, Pb., Prod., I., 566.* See **A. pictum**, *Thunb.*

A. Hookeri, *Miq.; Fl. Br. Ind., I., 694.* 336

Vern.—*Lal kabashi*, NEPAL; *Palé*, LEPCHA.
Reference.—*Gamble, Man. Timb., 99.*

Habitat.—A deciduous tree, found in Sikkim and Bhután, above 7,000 feet. Plants with copper-coloured foliage are not uncommon about Darjiling.

Maple Timber.

Botanic Diagnosis.—*Leaves* undivided, finely duplicate-serrate, ovate caudate-acuminate, base 5-nerved, cordate, both sides green and sub-glabrate. *Racemes* puberulent, simple, nearly equal and appearing with the leaves. *Fruit* glabrous; *carpels* ¾ to 1 inch long; *wings* venose, widening above and divergent, *back* slighly curved.

TIMBER 337 **Structure of the Wood.**—Grey. Weight 37 lbs. per cubic foot.

338 **Acer lævigatum,** *Wall.; Fl. Br. Ind., I., 693.*

Vern.—*Saslendi, cherauni, thali kabashi,* NEPAL; *Tungnyok,* LEPCHA.

References.—*Brandis, For. Fl., 110; Gamble, Man. Timb., 99 Kurz.; For. Fl. Burm., I., 289.*

Habitat.—A deciduous tree, found in the Himálaya from the Jumna eastward to Bhután, between 5,000 and 9,000 feet; in the Khásia Hills, and in Tenasserim.

Botanic Diagnosis.—*Leaves* undivided, quite entire or minutely serrate, when young ovate-oblong acuminate, glabrous, penninerved, reticulate, green on both surfaces, base rounded three-nerved. *Cymes* panicled, glabrous, appearing with the leaves. *Fruit* glabrous; *carpels* 1 to 1¼ inch long; *wings* venose, slightly diverging, widened above, *back* curved.

A handsome tree with broad, oval crown, flowering in April, and ripening its fruit in July and August. Bark smooth, yellowish, or dark ash-coloured.

TIMBER. 339 **Structure of the Wood.**—White, shining, hard, close-grained. Weight 43 lbs. per cubic foot.

DOMESTIC. 340 Used for planking and tea-boxes. Much used in Nepal for building.

341 **A. oblongum,** *Wall.; Fl. Br. Ind., I., 693.*

Vern.—*Mark,* PB.; *Mharengala, patangalia, kirmoli,* N.-W. P.; *Pugila, busimpúla,* NEPAL.

References.—*Brandis, For. Fl., 110; Gamble, Man. Timb., 99.*

Habitat.—A moderate-sized, deciduous tree, found in the Himálaya from the Jhelum eastward to Bhután, up to 6,000 feet in altitude.

Botanic Diagnosis.—*Leaves* undivided, quite entire, oblong-ovate acuminate, penninerved, silvery glaucous beneath, base obtuse, 3-nerved. *Cymes* panicled, appearing with the leaves. *Fruit* glabrous; *carpels* 1 to 1¼ inch long; *wings* venose, diverging, contracted below, *back* nearly straight; cells woody, angular, clothed inside with white hairs.

Never leafless, the mature foliage of a deep dark-green colour. A gregarious tree, flowering in February to April, the fruit ripening in June to November.

TIMBER. 342 **Structure of the Wood.**—Light reddish-brown, moderately hard, close-grained. Annual rings faintly marked. Weight 45 lbs. per cubic foot.

DOMESTIC. 343 Used for agricultural implements and drinking-cups.

344 **A. pictum,** *Thunb.; Fl. Br. Ind., I., 696.*

Syn.—A. LÆTUM, *C. A. Mey.;* A. TRUNCATUM, *Bunge;* A. CULTRATUM, *Wall., Pl. As. Rar.*

Vern.—*Tilpattar, trekhan, tarkhana, kakkru, kansal, kánjar, jarimu, laur,* PB.; *Trikunda* or *trikanna,* MURREE; *Mandal, maner,* CHUMBA; *Trekhan,* HAZARA; *Tian,* KANÁWÁR; *Kanchli,* N.-W. P.; *Dhadonjra,* SIMLA.

References.—*Brandis, For. Fl., 112; Baden Powell, Pb. Prod., I., 566; Gamble, Man. Timb., 101.*

Habitat.—A beautiful, moderate-sized tree, met with in the temperate Himálaya from Kashmír, altitude 4,000 to 6,000 feet, to Bhután, altitude

9,000 feet. A widely diffused species, being distributed to Japan, China, the Caucasus, Armenia, and North Persia; the type in these widely different countries constantly preserving itself. It is the most abundant Maple in the Himálaya, flowering in April, and the fruit ripening in July and August.

Botanic Diagnosis.—*Leaves* 5-7-lobed, glabrescent, except hairy tufts on the axils of the basal nerves, cordate, lobes lanceolate caudate, entire, green on both sides. *Cymes* corymbose, appearing with the leaves. *Fruit* glabrous; *carpels* $1\frac{1}{8}$ to $1\frac{3}{4}$ inch long, divaricating almost in one line; *wings* sinuous, venose, *back* arcuate; *cells* compressed.

Properties and Uses—

Medicine.—The KNOTS on the stem are made into the curious water-cups supposed by some of the hill tribesto have a medicinal influence over the water. The LEAVES are said to yield an acrid juice in Kanáwár, which blisters the hands; but in most other parts of the Himálaya they are lopped off as fodder. MEDICINE. Cup. 345 Leaves. 346

Fodder.—The branches are lopped for fodder. FODDER. 347

Structure of the Wood.—Pinkish white, soft to moderately hard, close-grained, fairly strong and elastic. Weight 41 lbs. per cubic foot. TIMBER. 348

It is used for the construction of ploughs, bedsteads, and poles to carry loads. Thibetan drinking-cups are made of the knotty excrescences; in fact this is the species most frequently used for this purpose.

Acer sikkimense, *Miq.; Fl. Br. Ind., I., 694.* 349

Vern.—*Palegnyok,* LEPCHA.

References.—*Gamble, Man. Timb., 99.*

Habitat.—A small tree, found in the hills in Sikkim and in Bhután, from 7,000 to 9,000 feet, and in the Mishmi mountains.

Botanic Diagnosis.—*Leaves* undivided, minutely serrate, ovate, cuspidate, cordate, penninerved, with 5 basal nerves, sub-coriaceous, glabrous, green on both sides. *Racemes* spicate and glabrate, appearing with the leaves. *Fruit* glabrous; *carpels* $\frac{5}{8}$ to $\frac{3}{4}$ inch long; *wings* venose, diverging, widened above; *back* straight or slightly curved; *cells* not angular.

Structure of the Wood.—Shining, grey; annual rings distinct. Weight 37 lbs. TIMBER. 350

A. Thomsoni, *Miq.; Fl. Br. Ind., I., 695.* 351

Syn.—A. VILLOSUM, *Wall.;* var. THOMSONI, in *Hook. Fl. Ind., I., 695.*

Vern.—*Kabashi,* NEPAL.

References.—*Brandis, For. Fl., 109.*

Habitat.—A large tree, often 150 feet in height, found in the hills in Sikkim and in Bhután, altitude 4,000 feet.

Botanic Diagnosis.—By the *Flora of British India,* this is reduced to a mere variety under **A. villosum.** In Mánipur I compared this with **A. villosum** carefully, side by side, and I regard **Thomsoni** as a distinct and well-marked species, which should be placed in the section with undivided leaves having 5 basal nerves. *Leaves* ovate, cordate, acute, entire or 3-angled on the apex, but never 5-lobed or even 5-angled; a foot or more long, thick, coarse, glabrous.

Structure of the Wood.—Greyish white, soft, and very brittle. A tree, 150 feet in height, hewn down by me in the Koupra forest, Mánipur, having a stem 80 feet without branches, was shattered to pieces by the fall. Weight 44 lbs. per cubic foot. TIMBER. 352

353 **A. villosum,** *Wall.; Fl.Br.Ind., I., 695.*

Vern.—*Karendera,* SIMLA; *Kikalnshing,* N.-E. KUMAON.

References.—*Brandis, For. Fl., 111; Gamble, Man. Timb., 100.*

Habitat.—A distorted, deciduous tree, 80 feet in height, found in the North-West Himálaya from the Jhelum to Nepal, between 7,000 and 9,000 feet, and in Mánipur (on the eastern frontier of Assam), altitude 6,000 feet.

Botanic Diagnosis.—*Leaves* 3-5-lobed, cordate, 5-nerved, lobes ovate or lanceolate, serrate or repand, thin, shining, membranous, glabrous or tomentose below (the latter condition being simply the younger or less exposed condition upon the same tree). *Racemes* branched or simple, pubescent, appearing a little before the leaves. *Fruit* puberulent, brownish; *carpels* 1½ to 2¼ inches long, diverging; *wings* venose, margins often crenulate; *back* rather curved; *cells* angular, nervose.

A handsome tree with the stem-bark grey; flowering in February and March, the leaves appearing in May and the fruit ripening in June.

FODDER. 354 **Fodder.**—Leaves lopped for fodder.

TIMBER. 355 **Structure of the Wood.**—White, moderately hard, close-grained, beautifully mottled and shining; annual rings distinct. Weight 38 lbs. per cubic foot. Not used.

ACETUM.

356 **Acetum.**

VINEGAR, *Eng.*; VINAIGRE, *Fr.*; ESSIG, *Germ.*; ACETO, *It.*; VINAGRE, *Sp.*

Vern.—*Khall,* ARAB.; *Sirkah,* PERS.; *Sirka,* HIND.; *Kádi,* TAM.; *Shukta,* SANS.

References.—*Spons' Encyl., 2038; U. S. Dispens., 15th Ed., 18; Smith on Foods, 230; Balfour's Cycl., V., under "Vinegar"; Baden Powell's Pb. Prod., I., 312; Pharm. Ind., 267; Year-Book of Pharm. 1875, 46; 1876, 35, 376; 1878, 159, 160, 174; 1882, 119; The Vinegar Plant, Treasury of Botany; Smith's Dictionary of Economic Plants, &c.*

Vinegar is an acid liquid, used largely as a food auxiliary, and to preserve certain articles of food, as a medicine, and for industrial purposes. It is produced (*a*) by what is known as acetous fermentation of a mixture of malt and unmalted grain (forming malt vinegar), and (*b*) by the oxidation of white or red wine (forming the white and red wine vinegar). Chemically, vinegar is a dilute solution of acetic acid ($C_2 H_4 O_2$) with certain organic substances derived from and peculiar to the source from which it is derived. "The finest artificial table vinegar is prepared by mixing 15 parts of glacial acetic acid (of at least 99 per cent.) with 235 parts of water and one part of alcohol (94 per cent.) or by adding to 250 parts of diluted acetic (6 per cent.) 1 part of alcohol. If allowed to stand a few weeks, the mixture will develop enough acetic ether to impart to it a fine flavour; it may be coloured with caramel, hut is much nicer and cleaner without it. A popular prejudice in favour of malt, cider, and other similar vinegars should be gradually removed. (*Dr. D.R. Squibb.*)" (*Dr. Charles Rice, New York.*) Instead of being made from malt vinegar it is also largely derived from artificial glucose ($C_6 H_{12} O_6 H_2 O$) and cane-sugar or molasses ($C_{12} H_{22} O_{11}$); the substance thus produced is identical with malt vinegar.

PREPARATION OF VINEGAR.

THE GERMAN PROCESS.

MALT VINEGAR. 357 **Malt Vinegar.**—There are various processes for producing vinegar from malt, the practice chiefly prevailing in England being that known

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as the "German process." The grain (wheat, barley, oats, rice, maize, or other grain) is broken and the husk thereby got rid of. This is necessary, since the phosphoric compounds of the husk retard the process, and the presence of the husk in the vats would add an unnecessary amount of vegetable matter. The unmalted grain must be well dried over a kiln previous to crushing, in order that many of the glutinous and albuminoid compounds of the grain may be destroyed. If this be not done the vinegar will not keep well. The crushed grain is now conveyed to the "Mash tun" and there mixed intimately with water at 77° (170° Fahr.). After an hour the wort is conveyed to the boilers and well boiled for the purpose of coagulating the albumen. It is then mixed with a certain proportion of malt grain, which has the affect of converting the insoluble starch into glucose. Malt grain alone canhot be used, as it contains much more *diastase* than is necessary for the conversion of its starch into *glucose*. The superabundance of *diastase* would produce secondary and putrefactive fermentation. It is therefore necessary to mix it with unmalt grain which has previously been roasted on a kiln to destroy its glutinous and albuminoid compounds. These compounds compose the protoplasm from which the *diastase* is derived.

During the germination of a grain a portion of the protoplasm becomes converted into a chemical substance known as *diastase*. This substance has the curious property of converting the insoluble starch contained in the grain into a soluble saccharine compound, namely, first into *dextrine*, and then into artificial *glucose*. In the economy of plant life this curious action allows the embryo plant to obtain a soluble food from the seed, enabling it thereby to produce and develope a root which soon supplies the further wants of the plant. The proportions in which the malt and unmalt grain should be used will depend very much upon the nature of the grain, and can be determined by experience or experiment only.

The Chemistry of Vinegar.—Up to this stage the manufacture of vinegar is almost identical with beer-brewing. The mass, by the chemical action described, having been converted into glucose, is run into the fermenting vat, and yeast added, when fermentation at once commences. Unlike beer-brewing, it is now the object of the vinegar-maker to convert the whole of the glucose into alcohol. This is done by forced and repeated additions of yeast; the glucose being converted into alcohol and carbonic acid eliminated:— 358

Glucose. Alcohol.

$$(C_6H_{12}O_6) = (2C_2H_6O) + 2CO_2.$$

When the entire volume has been converted into an alcoholic liquid it is pumped into vats and allowed to clear itself of dead yeast and cloudiness by subsidence. It is then passed through a filter into the acetifier. It is the process by which this alcoholic liquid is at this stage converted into acetic acid (or vinegar) that constitutes the difference between the various processes of vinegar-brewing. In the German process, for a period of about six weeks, the liquid is being constantly pumped from the bottom of the acetifier or vinegar-generator and made to fall down again in a finely divided condition, by passing through small openings in a wooden lid placed over the top of the generator, thereafter to trickle through a layer of specially prepared or purified beech twigs or charcoal. While trickling through these contrivances the alcoholic liquid becomes oxidised and reduced thereby to vinegar. This is accomplished by two atoms of hydrogen separating from the alcohol and forming with one atom of oxygen from the air a molecule of water. By this separation of hydrogen the alcohol is reduced to the inflammable ethereal liquor known as aldehyde

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(or alcohol dehydrogen). By the absorption of an atom of oxygen from the air this compound is next formed into acetic acid :—

$$\underset{\text{Alcohol.}}{C_2H_6O} + \underset{\text{Oxygen.}}{O} = \underset{\text{Aldehyde.}}{C_2H_4O} + \underset{\text{Water.}}{H_2O}$$

$$\underset{\text{Aldehyde.}}{C_2H_4O} + \underset{\text{Oxygen.}}{O} = \underset{\text{Acetic acid.}}{C_2H_4O_2}$$

The whole process of making malt vinegar occupies about two months, after which time it is stored in vats for the purpose of cleansing, colouring, &c.

THE FRENCH PROCESS.

359 According to **Pasteur** the process of acetification is not spontaneous oxidation, caused through the simple exposure of an alcoholic liquid to the complete influence of the oxygen of the air, but is due to the oxidising influence of the growth of a mycoderm closely allied to dry rot (see Vinegar Plant) within the vinegar generator. The chemical actions indicated are quite correct, but the initial or starting agent in these changes is the growth of the vinegar plant upon the oxidising apparatus. In support of this theory, it may be stated that, in the absence of light, both fermentation and acetification is greatly retarded, light being necessary for the growth of the yeast and vinegar plants.

Vinegar may be clarified by throwing about a tumblerful of boiling milk into fifty gallons of the liquid and stirring the mixture. This operation has the effect at the same time of rendering red vinegar pale. At one time it was thought necessary to add free sulphuric acid to vinegar in order to stop further chemical changes and to destroy the mycoderm which might still be surviving within the liquid. The law formerly authorised 1 part of acid in 1,000 of vinegar. The necessity for acid is the confession of defective preparation, chiefly due to the whole of the glucose not having been changed into alcohol, or to too much diastase having been formed in the wort. According to the "Food and Drug Adulteration Act," the addition of sulphuric acid, in however small a proportion, constitutes an adulterant. Accordingly, **Pasteur** recommended that the mycoderm should be systematically sowed and the alcoholic liquid carefully added, until complete acetification be accomplished. The mycoderm exists in two forms (which may be distinct species), both of which have the power of acetification. In the one it consists of extremely small globules (micrococci), arranged and adhering together in contiguous rows (sometimes, in addition, enveloped in a glue-like mass). In the other the mycoderm is made up of rod-like forms (bacilli).

This has been called the FRENCH PROCESS, and it was originally applied practically in 1869 by **Beton-Laugier**, and more recently perfected

360 by **Mr. Emanuel Warm.**

THE QUICK GERMAN PROCESS.

This is chiefly practised on the Continent, and consists in taking alcohol and water instead of malt. Alcohol being free of duty (on the Continent), this can be done at a price which admits of competition with the ordinary malt vinegar. The pleasant aromatic odour of the malt vinegar is obtained by mixing a small quantity of the brewed wort with the alcohol and water.

WINE-VINEGAR. White. **Wine-Vinegar** or **Acetum Gallicum.**—This is made from either white or red wine giving origin to white and red wine vinegar. This is chiefly prepared from wines which have shown a tendency to become sour. It

361 is the sugar present in the wine which acts as the ferment, when wine

Wine-Vinegar. | ACETUM.

naturally undergoes acetous fermentation. In the same way vinegar is made from ciders molasses, &c. Red. 362

To prepare wine-vinegar, casks capable of holding 100 gallons are arranged in rows in a shed kept at the temperature of 75° to 85°. The casks are open at the top to allow free access of air. A small quantity of boiling vinegar is added to each cask, and every eight or ten days a few gallons are added until the casks are two-thirds full. After 10 to 14 days the acetous fermentation is complete. A few gallons of vinegar are withdrawn from each and wine added, and so the process is carried on. Upon the inside of the older casks a crop of the mother-of-vinegar plant will be found, and when once established this greatly accelerates the fermentation.

Wine-vinegar is said to always contain a little aldehyde. It is nearly one-sixth stronger than pure malt vinegar. 363

Chemical Tests.—Vinegar should have the sp. gr. of 1·017 to 1·019. If aldehyde be present (sometimes the case in wine-vinegar), its presence may be at once detected by Trommer's test, for having, like glucose, the power of absorbing oxygen, the red sub-oxide of copper will be precipitated from Fehling's test solution proving the presence of aldehyde. The most dangerous impurities are copper, lead, and even tin, derived through carelessness from the apparatus used. These metals will at once be detected through the black precipitate thrown down in the vinegar on the addition of sulphuretted hydrogen gas, and by no precipitate being formed on being boiled with common salt. Vinegar should also be devoid of free sulphuric acid. If 10 minims of a 10% solution of chloride of barium be added to one fluid ounce of vinegar, and the resulting precipitate (if any) removed by filtration, the further addition of the barium solution would give no further precipitation if the amount of sulphuric acid formerly authorised (1 in 1,000) were present. It must not, however, be overlooked that this test would not only throw down sulphuric acid (if present), but also any sulphate which might exist in the vinegar. The presence or absence in vinegar of free sulphuric acid may be conveniently demonstrated by saturating a piece of white paper or of loaf-sugar with the vinegar. On evaporating the vinegar, the paper or sugar will become charred should the acid be present. (For charring tests, see *Year-Book of Pharm., 1878, 174.*) **Dr. A. Jorissen** (in *Journ. de Pharm., d'Anvers 1881, 233*) describes a new and interesting mode of detecting mineral acids in vinegar. To a mixture of one drop of gurjun oil and 25 drops of glacial acetic acid, one drop of vinegar is added, and after agitation, four to six drops of ordinary acetic acid is added. No reaction takes place if the vinegar be free from mineral acids, but if these be present, a violet colour is produced, which does not disappear on the addition of alcohol.

In commerce the strength of vinegar is determined by the number of grains of dry carbonate of soda required to neutralise 1 fluid ounce. This is he practice in England, but in the U. S. America carbonate of potash is used. The strength of vinegar may be accurately determined by means of a standard solution of bicarbonate of potash, one fluid ounce of vinegar becoming saturated with 35 grains of the potash salt. After filtration the remaining liquid should now be quite free from acidity; if not, this would prove the presence in the vinegar of other acid substances, the presence of which was disguised by the acetic acid.

Vohl (in *Ber. der deutsch. Chem., Ges., November 1877*) has designed a simple contrivance to determine the amount of acetic acid in vinegar, consisting of a flask provided with a $CaCl_2$ tube, closed by a caoutchouc stopper, through which passes a glass rod terminating in a platinum hook, and supporting a tube of sodium bicarbonate. The

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apparatus is weighed alone, the vinegar added, and after weighing, the bicarbonate is lowered into the liquid. The resultant CO_2, after being entirely removed by suction, is determined by the loss of weight, and the acetic acid calculated therefrom. A more rapid mode of arriving at the same conclusion has been published by **Dr. Jehn** (*Ber. der deutsch Chem., Ges., Dec. 10th, 1877*). This consists in introducing 10 c.c. of the vinegar into a flask containing an excess of sodium bicarbonate, from which the liberated CO_2 is conducted into a second jar filled with water. The fall of the level of water displaced by the carbonic acid will indicate the volume of gas liberated, and from this the percentage of acetic acid contained in the 10 c.c. of vinegar may be determined. The jar may be so graduated as to indicate at once the percentage composition, or the displaced water may be conducted into an accurately graduated cylinder, indicating by the volume of water the same result. (*Archiv. der Pharm., May 1877; Year-Book of Pharm., 1878, 160; U. S. Dispens., 15th Ed., 20.*)

Adulterations.—In addition to sulphuric acid, copper, lead, and tin are commonly met with.

364 **Indian Vinegar.**

§ "The acidity of vinegar is due to the presence of acetic acid. An impure variety, pyroligneous acid, is a product of the destructive distillation of wood. Glacial acetic acid, the variety which crystallises below 63° Fahr., is obtained by converting the crude acid into a salt, and distilling the purified and dried acetate with concentrated sulphuric acid. Acetic acid is also largely obtained by the oxidation of alcohol. An aqueous solution of pure alcohol will not yield acetic acid on exposure to air, but when mixed with certain easily changeable organic materials, it undergoes the so-called acetous fermentation. But this oxidation can also be brought about by inorganic oxidising agents. According to **Pasteur** the first described variety of fermentative action is due to the presence of a mycoderm, the *Mycoderma aceti*, which, when developed in large quantity, is commonly called "the mother of vinegar." The acidification of wines thus yields "white" and "red" wine vinegar, while beer or malt infusions produce the "brown" malt vinegar of commerce. When solutions of malt or saccharine substances are used for the manufacture of vinegar, the sugar is first converted into alcohol by yeast, and then on exposing the so-formed dilute alcohol to air, oxidation of the alcohol occurs with the formation of acetic acid. As a rule vinegar contains about 5 per cent. of acetic acid.

"In India, vinegar is made from toddy, the fresh juice of the **Borassus flabelliformis** and **Cocos nucifera**, and also from the inspissated juice, jaggery, by dissolving it in water and exposing the solution to air in earthen jars. The dried flowers of the **Bassia latifolia**, *mohwa*, infused in water, also yield a saccharine liquid which readily undergoes the acetous fermentation, and produces an excellent vinegar. Regarding the strength of country vinegars, according to **Dr. Lyon's** experiments, the amount of acetic acid ought to be at least from 4 to 5 per cent. in toddy vinegar. Many samples have, however, been found to contain less than 3 per cent., and in one case the acidity was as low as one and a half per cent." (*Surgeon C. J. H. Warden, Calcutta.*)

The manufacture of vinegar may almost be said to be common to every district in India, especially in Mahomedan centres; the Hindús use very little except as medicine. The alcoholic liquid is placed in enormous earthen jars half imbedded in the soil and left until the acetification has been accomplished. The article produced is very inferior in quality to European vinegar, and is entirely consumed within the country, being largely used in the preparation of pickles, &c. **Mr. Baden Powell** says:

"The vinegar obtained from sugar-cane juice is generally a poor stuff, and does not contain more than 2 per cent. acetic acid; but at some places it is made well, especially at Delhi. A large number of bottles of vinegar sold in the country, with the ticket and capsule of 'Crosse and Blackwell,' are in reality bottles which once contained the real article, but when emptied, are refilled with country vinegar, and sold a little cheaper under the above name. I have seen, however, really excellent vinegar from Peshāwar which was made from grapes; it was quite fit for table use."

There appears to be no export trade in vinegar, and the extent of the import trade cannot be determined, since it is included under the heading of Oilman's Stores.

MEDICINAL USES OF VINEGAR.

§ "In India, vinegar is made from rice, sugar, various fruits, &c., and is largely used by hakims as a medicinal agent. In the pure state it is escharotic. Applied externally, mixed with sweet oil or water, it is largely used for congestive headaches, and in sunstroke. In catarrh it is used like smelling-salts. As a vapour bath it is useful in reducing the high temperature of fevers. It is extensively made use of by hakims for the destruction of ectozoa and entozoa. The vapour of vinegar applied to the ear is beneficial in earache and deafness. In dyspepsia with foul breath the natives use it internally mixed with salt, and this same mixture, combined with alum, is employed as a dentifrice and astringent for bleeding gums. For sore-throat it is used as a gargle mixed with hot water. Diluted solutions are given as cooling draughts and to quench thirst. Highly prized by natives for reducing obesity. The vinegar made from grapes, mixed with salt, is a local application to the bites of mad dogs; it is also a much-prized remedy for ringworm. A weak solution is applied to burns and scalds. Combined with sulphur it is said to be beneficial in chronic rheumatism and gout. Mixed with sweet oil it is applied locally over rheumatic and stiff joints. If used for any length of time it is an anaphrodisiac." (*Surgeon G. A. Emerson, Calcutta.*) MEDICINE. 365

"Vinegar (a wine glassful) is recommended by **Dr. Grigg*** in cases of *post partum* hœmorrhage, but its action is so rapid that he refrains from using it or permitting its use before the placenta is expelled, for fear of causing a retention of that body and making its removal difficult. (See *British Medical Journal, January 12, 1884, p. 56.*)" (*Brigade Surgeon W. H. Morgan, Cochin*).

"I have found it effectual (as recently suggested in *Br. Med. Journal*) in *post partum* hœmorrhage, in dose of a W. 'F. wine-glassful." (*Surgeon-Major W. Farquhar, M.D., Ootacamund.*) "A solution of borax in vinegar is much used for ringworm in dispensary practice." (*Asst. Surgeon Jaswant Rai, Multan.*)

"Vinegar, prepared from toddy obtained from the Palmyra palm fermentation, is very effectual in checking troublesome hiccough; a diluted solution of vinegar has been frequently used by me to check the intolerable itching in some forms of herpes and with very good effect." (*Hon. Surgeon Easton Alfred Morris, Negapatam.*)

"Mahwa vinegar is particularly useful as a diaphoretic, especially when neutralised by carbonate of ammonia, a cheap and valuable kind of Liquor Ammoniæ Acetatis." (*A Contributor.*) "Also used in cases of cholera, diluted with water, in the form of a drink; and for this purpose, it is prepared from sugar-cane juice by keeping it exposed to the sun,

* **Physician to Queen Charlotte's Hospital.**

till fermentation ensues." (*Assistant Surgeon Anund Chunder Mukerji, Noakhally.*) "The efficacy of vinegar gargle in sore-throat is considerably increased by the addition of a few grains of powdered capsicum." (*Brigade Surgeon S. M. Shircore, Moorshedabad.*)

366 ACHILLEA, *Linn.; Gen. Pl., II., 419.*

A genus of pubescent herbs (belonging to the Tribe ANTHEMIDEÆ of the Natural Order COMPOSITÆ), comprising some 50 species, distributed throughout the north temperate regions of the globe, one species being met with on the Himálaya from Kashmir to Kumaon. *Leaves* alternate, narrow, serrulate or pinnatisect. *Flower-heads* small, corymbose, heterogamous and rayed, or homogamous and disciform (or rayless). *Ray-flowers* few, male, rarely neuter, ligulate, short, white, pinkish or yellow. *Disk-flowers* hermaphrodite, tube terete or compressed and 2-winged, base often produced over the top of the achene, limb 5-fid. *Involucre bracts* few, seriate, appressed; *receptacle* flat or elevated, paleaceous. *Anther-cells* obtuse at the base (not produced into tails). *Pappus* absent. *Achenes* oblong or obovoid, dorsally compressed, glabrous, with two cartilaginous wings.

The name **Achillea** is given because of its being supposed to be the plant with which Achilles cured the wounds of his soldiers. By the ancients the aromatic plant used for this purpose received the name of ἀχίλλειος.

367 Achillea millefolium, *Linn.; Fl. Br. Ind., III., 312.*

MILFOIL or YARROW, *Eng.;* HERBE AUX CHARPENTIERS, MILLEFEUILLE, *Fr.;* SCHAFGARBE, SCHAFRIPPE, *Germ.;* MILLEFOGLIE, *It.;* YERBA DE SAN JUAN, *Sp.*

By the older English writers, this plant received the name of NOSE-BLEED, because the leaves, if inserted in the nostrils, were supposed to cause bleeding to take place.

Vern.—*Rojmari*, BOMB.; *Biranjasif*, CUTCH. **Stewart** says this is one of the plants sold in the bazars under the names *Momádrú chopándiga*, KASHMIR; *Búi máderán*, AFG.

References.—*Dymock's Mat. Med. W. Ind., 356; U. S. Dispens., 15th Ed., 1560; Bentl. & Trim., III., 153; Waring, Pharm. Jour. Ser. 2, V., 504; Proc. Amer. Pharm. Assoc., 1862, 113; Watt's Dict. Chem., I, 36.*

Habitat.—A native of North Asia, Europe, and America, and of the Western Himálaya, from Kashmír to Kumaon; altitude 6,000 to 9,000 feet. Common on the hills a little to the north of Simla.

Botanic Diagnosis.—A small, herbaceous plant, ½ to 1½ feet in height; glabrous or pubescent, with leaves 2-6 inches long. *Leaves* oblong-lanceolate, 3-pinnatisect, minutely divided into linear, dentate, mucronate segments. *Flower-heads* corymbose ovoid, shortly pedunculate. *Achenes* shining.

Properties and Uses—

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Medicine.—The LEAVES and FLOWER-HEADS are used medicinally as an aromatic stimulant (see **Artemisia vulgaris**). They are also used as a tonic, and in medicated vapour baths for fever.

In Scotland at the present day a warm decoction of the fresh leaves is regarded as a family specific against the colds and other ailments common to childhood. This plant once held a creditable position amongst British drugs, and its recent introduction into the American Pharmacopœia may have the effect of reviving its use in England. It might, with great advantage, be added to our list of Indian indigenous drugs. Formerly it was much used in England as "a vulnerary, and was given internally for the suppression of hæmorrhages and of profuse mucous discharges. It

was employed also in intermittents and as an antispasmodic in flatulent colic and nervous affections. Its hot infusion is used as an emmenagogue in France, and also in suppression of the lochia; it is sometimes employed in low exanthematous fevers with difficult eruption. In these cases it probably acts as a stimulant sudorific, as do most aromatic herbs. In some parts of Sweden it is employed as a substitute for hops in the preparation of beer, which it is thought to render more intoxicating." (*U. S. Dispens., Ed. 15th, 1560.*) (For this curious property compare remarks under **Absinthe** and **Artemisia Absinthium**, *Linn.*)

§ "Carminative, dose 5 to 30 grains. (*Surgeon W. Barren, Bhuj, Cutch.*)

Chemical Composition.—**Von Planta-Reichenau** found in this species as also in **A. moschata** (the *Iva* of Europe), a bitter, aromatic, bluish-green, volatile oil, *Ivaol* ($2C_{12}H_{20}O$), a substance faintly resembling oil of peppermint and a peculiar nitrogenous principle *Moschatin* ($C_{21}H_{27}NO_7$) (*Ann. Chem. Pharm., CLV., 145*). The aromatic property is strongest in the flowers and the astringency in the leaves. **Zanon** found in addition to the volatile oil and *moschatin*, a third substance which has been called *Achillein*, a compound which has been determined to be composed of $C_{20}H_{38}N_2O_{15}$ (*Ann. Chem. Pharm., LVIII., 21, and CLV., 1870*), a bitter principle soluble in water, but with difficulty in absolute alcohol. **S. de Luca**, experimenting with **A. Ageratum**, has found similar results. This plant, when rubbed between the hands, gives out an aromatic camphorous odour, and if distilled in a current of steam, furnishes an essential oil, the composition of which has been found to be $C_{26}H_{44}O_3$ (*Year-Book, Pharm., 1876, 43; 1881, 156*). 370

Dr. Dymock says that the flowers of **A. Santolina**, *Stocks* (? *Linn.*), are used in the Bombay Presidency, and are known as *biranjasif, buimád-eran*, PERS. This plant is apparently imported into Bombay from Persia, where it is called *dermeneh*, or vulgarly *varek* or *yoshen*. It is not a native of Egypt.

Domestic Uses.—A large number of species and cultivated forms of **Achillea** are met with in gardens in Europe, many of them forming highly ornamental foliage clumps for border and bed cultivation. They are propagated by root divisions, cuttings, and seeds. **Ornamental foliage. 371**

Achilleinum—A spirit, distilled from **Achillea millefolium**, is used by the Italians in intermittent fever. **Achilleinum spirit. 372**

ACHIMENES, *P. Br. Hist. Jam., 271; Gen. Pl., II., 998.* 373

A genus of elegant, villose herbs (belonging to the Natural Order GESNERACEÆ). They are all favourites of the modern gardener, and his art has perhaps done more to multiply the cultivated forms of this than any other genus of similar size. They are occasionally met with in our Indian orchid houses, but require great care: they are natives of tropical America. The Natural Order GESNERACEÆ is sub-divided into three great sections or sub-orders. The Indian indigenous examples belong to the CYRTANDREÆ (characterised by having ex-albuminous seeds contained within a contorted capsule or berry). The ACHIMENES belong to the sub-order characteristic of America, *viz.*, GESNERACEÆ, recognised by having albuminous seeds, contained within a capsular fruit, semi-inferior or inferior.

In **Achimenes** the *flowers* are large, axillary, variously coloured. *Corolla* tubular, straight or curved, often obliquely dilated at the mouth. *Anthers* in fours, connivent or coherent, included within the corolla, the *filaments* being attached to the base of the tube. *Disk* annular, entire or 5-lobed. *Ovary* inferior, cohering to the base of the calyx; *style* elongated; *stigma* dilated and concave or sometimes distinctly 2-lipped. Chiefly **Ornamental plants. 374**

tomentose herbs with spherical rhizomes, from which they are readily propagated.

By some authors the genus has been broken up into various genera, of which perhaps **Tydæ** is the most deserving of an independent position. The following may be mentioned as a few of the more important species generally met with in cultivation : **A. coccinea**, especially *var.* **major** ; **A. Escherii** ; **A. floribunda elegans** ; **A. formosa** ; **A. grandiflora** ; **A. Jayii** ; **A. longiflora** ; **A. Mountfordii** ; **A. patens** ; **A. pedunculata** ; &c. They are perennials, the leaves dying annually. When the old rhizomes commence to give off-shoots, these should be collected and planted six in a pot in a soil composed of equal parts of loam, leaf-mould, and sand.

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ACHRAS, *Linn.* ; *Gen. Pl., II.,* 657.

A genus comprising only one or two species (belonging to the Natural Order SAPOTACEÆ). By *DeCandolle's Prodromus* this genus was reduced to Sapota, but **Bentham** and **Hooker** in their *Genera Plantarum* have restored it. The genus may be briefly defined as having the *flowers* clustered in the axils of the leaves, 6-merous, with leafy *staminodes* inserted upon the lower part of the corolla, and nearly as large as the petals. *Stamens* 6; *filaments* complanate-subulate, opposite the petals. *Fruit* superior, 8-10 celled, with one large, erect, albuminous seed in each cell.

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Achras Sapota, *Linn.* ; *Fl. Br. Ind., III.,* 534.

The SAPODILLA PLUM of the WEST INDIES ; the BULLY TREE, or NEESBERRY.

Syn.—MIMUSOPS MANILKARA, *Don.*

Vern.—*Sapotá,* HIND. and BENG. ; *Chikali,* BOMB. ; *Shimai-eluppai,* TAM. ; *Sima-ippa,* TEL. ; *Kumpole,* KANARA ; *Chakchakóti-kajhár,* DUK. ; *Twotta pat,* BURM.

The Tamil name should not be confused with the names applied to MIMUSOPS and to BASSIA.

Habitat.—Introduced from America, and now cultivated throughout India. **Roxburgh** speaks of the Chinese specimens not flowering in the Calcutta Botanic Gardens, while the West Indian plants growing alongside of them were doing so. It would thus appear that the plant apparently reached India by way of China as well as direct from the West Indies.

An evergreen tree, with dome of dark-green shining leaves. The fruit is about the size of a hen's egg, and much of the same shape, dark brown, with a sort of mealy surface. Pulp greenish brown, with generally 2 or 3 seeds developed. When ripe, and just before it becomes over-ripe, the fruit is often very pleasant, although little eaten by Europeans in India. Commonly sold in the streets of Calcutta, about the beginning of the hot season, under the name of *Mangosteen,* a fruit which, at first sight, it somewhat resembles. The absence of the sessile peltate stigma, so characteristic of the apex of the Mangosteen fruit, will at once remove the delusion, and expose the impostor, who makes a large profit by selling his fruit under a false name. "A fine evergreen tree, producing delicious fruit." (*Baron Von Mueller.*)

Fruit. 377

Medicine.—The bark was formerly regarded as a good and useful substitute for Cinchona.

MEDICINE. Bark. 378

Structure of the Wood.—**Kurz** says : "Wood uniformly brown, close-grained, rather light, hard ; valued in South America for the shingles of corn-houses." Wood "reddish brown, hard, heavy, and very durable (Bullet or Bully-wood of Central America and the West Indies.)" (*Brandis.*) "Wood is dull red, short, but straight in the grain and very dense." (*Bomb. Gaz., XV., Part I., 61, Kanara.*)

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ACHYRANTHES, *Linn.; Gen. Pl., III., 35.* 380

A genus of herbs or small shrubs (belonging to the Natural Order AMARANTACEÆ), found in the tropical and sub-tropical regions of the Old World.

Leaves opposite, petiolate, ovate oblong or lanceolate, entire. *Flowers* hermaphrodite, deflexed and compressed to the rachis, arranged in elongated, loose, terminal, simple or paniculate spikes, white or coloured. *Bracts* 3, the central large, in contact with the flower, the lateral spreading, spiny. *Perianth* of 4 to 5, green, rigid coriaceous; *sepals* sub-equal, subulato-lanceolate, aristato-acuminate, glabrous or pilose. *Stamens* 5, rarely 2 or 4; *filaments* subulate above the base, membranous, united into a cup; *anthers* oblong, 2-locular. *Ovary* oblong, sub-compressed, glabrous; *style* filiform; *stigma* capitate; *ovule* one, suspended. *Seeds* inverted, oblong; *testa*, thin, coriaceous; *arillus* absent; *albumen* farinaceous, *radical*, erect.

The name **Achyranthes** is derived from ἄχυρον, chaff, and ἄνθος, a flower or blossom, in allusion to the appearance of the flowers. There are in all about 12 species in the world.

Achyranthes alternifolia, *Linn.;* AMARANTACEÆ.

Syn. for **Digera muricata,** *Mart.*, which see.

A. aquatica, *Roxb.;* by **Wallich** formed into the genus CENTROSTACHYS, but by *Genera Plantarum* has been again reduced to ACHYRANTHES. 381

A. aspera, *Linn.* 382

THE PRICKLY CHAFF-FLOWER.

Vern.—*Apáng*, BENG.; *Apáng*, ASS.; *Latjirá, chichra, chirchira, chirchitta*, HIND.; *Agháda*, BOMB., MAR.; *Apámárga, ágháta, apángaka*, SANS.; *Utta-réni, antisha, apa márgamu*, TEL.; *Ná-yurivi*, TAM.; *Kutri*, PB.; *Kataláti*, MAL.; *Utráni-gida, uttaráne*, KAN.; *Aghedo*, GUJ.; *Atkumah*, ARAB.; *Khâre-vâshûn*, PERS.; *Kiva-lá-mon, kune-lá mon*, BURM.

References.—*DC. Prod. XIII., II. 314; U. C. Dutt, Sans. Mat. Med., 221; Dymock, Mat. Med. W. Ind., 538; Roxb., Fl. Ind., Ed. C.B.C., 226; Voigt's Hortus Suburb. Calc., 318; Drury's Us. Pl., II; Pharm. Ind., 184.*

Habitat.—A shrub, 3-4 feet high; found all over India, ascending to 3,000 feet in altitude. A troublesome weed in gardens.

Botanic Diagnosis.—Stem erect, striated. *Leaves* ovate-obtuse, acuminate, base cuniate, petiole short, pubescent from a coat of long simple hairs.

Properties and Uses—

The Ash as a Mordant.—The ashes of this plant are used as an alkali in dyeing. DYE. 383

Medicine.—THE WHOLE PLANT has astringent and diuretic properties assigned to it. Of the former property little is known for certain, but it is said to be successfully used in native practice in the treatment of menorrhagia and diarrhœa. It is reported to be used by the women of Bengal to produce abortion, and holds a high reputation for this purpose, but it most probably acts mechanically, the prickly flowering spikes being inserted into the uterus. A correspondent informs me that if THE JUICE of the plant be injected into the os uterus labour pains will be set up rapidly. On the other hand A DECOCTION of the plant is highly spoken of as "a laxative and promoter of secretions; it is used in combination with other medicines of its class in ascites and anasarca." (*U. C. Dutt, Civil Medical Officer, Serampore.*) **Dr. Bidie** says: "Various English practitioners agree as to its marked diuretic properties in the form of a decoction." **Dr. Cornish** reports favourably, having found it efficacious in the treatment of dropsy. It possesses valuable medicinal properties as a pungent MEDICINE. 384 Seeds. 385 Spikes. 386 Decoction. 387

and laxative, and is considered useful in dropsy, piles, boils, eruptions of the skin, &c. THE SEEDS and LEAVES are considered emetic, and are useful in hydrophobia and snake-bites. (*T. N. Mukharji's Amsterdam Catalogue.*)

As a POWDER the dried plant is given to children for colic, and also as an astringent in gonorrhœa (*Stewart's Panjáb Plants*).

Major Madden says that the FLOWERING SPIKES are regarded as a protective against scorpions, the insects being paralysed through the presence of a twig. **Dr. Shortt** reports on its use as an external applicant in the treatment of the bites of insects, and **Mr. Turner** calls attention to it as a remedy in snake-bite (*Pharm. Indica*).

Ash. 388 THE ASH yields a large quantity of potash, rendering it useful in the arts as well as in medicine. Mixed with orpiment it is used externally in the treatment of ulcers, and of warts on the body (*U. C. Dutt, Civil Medical Officer, Serampore*). Sesamum oil and the ash (*apamarga taila*) are used in the treatment of disease of the ear, being poured into the meatus. As an ash, however, there seems no reason to think it possesses any virtues other than those of the simple alkali of our shops.

The seeds are given in cases of hydrophobia and snake-bite, the juice of the flowering spikes for scorpion-bite, and the ashes of the plant have been successfuly used in dropsy. (*Bomb. Gaz., VI., 14.*) "In Western India the juice is applied to relieve toothache." (*Surgeon-Major W. Dymock, Bombay.*)

The drug is best administered in the form of a decoction prepared by boiling two ounces of the fresh plant in a pint and a half of water till reduced to one pint, then straining. Of this the dose is two fluid ounces or more, should the diuretic operation be desired.

389 **Special Opinions.**—§ "The seeds and also leaves relieve the pain of scorpion-bites and allay the irritation of boils and of pleurodynia. The juice of the leaves is useful in snake-bite. The dried leaves are smoked in asthma and they are also used internally in dropsy: dose 4 grains." (*Surgeon J. McConaghey, Shahjahanpore.*) "Is found highly useful in the treatment of general dysentery. (*Pharm. Ind., 184.*)" (*Surgeon H. McCalman, M.D., Bombay.*)

"No protection against scorpions. I have tried the flowery spikes, the root and branches, but the paralysing effect did not follow; the insects ran busily so soon as the pressure of the twig or root, &c., was removed." (*Surgeon B. Evers, M.D., Wardha.*)

"This is found useful as a diuretic in dropsical affections, and has been freely used in the hospital here in combination with other diuretics and tonics. "*Preparations:* Take of root with stems and leaves one ounce, water ten ounces, boil for fifteen minutes in a covered vessel and strain. *Dose*—From one and a half to two fluid ounces twice or thrice a day." (*Apothecary J. G. Ashworth, Kumbakonum.*) "The fresh leaves bruised into a paste and mixed with black pepper and garlic are used as an antiperiodic in the form of pills. It is given before the attack comes on." (*Surgeon-Major John Lacaster, M..B., Chittore.*) "Decoction of the entire plant is useful as a diuretic in dropsical affections; rubbed into a paste with a little water it forms a favourite application to stings of wasps, bees, and other insects." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*)

390 "In simple anasarca I have found it of marked benefit." (*Surgeon-General William Robert Cornish, F.R.C.S., Madras.*) "The tender leaves ground into a paste with a little sugarcandy, and with the addition of a little butter fried to a proper consistence it is useful in the early stage of dysentery." (*Surgeon-Major D. R. Thompson, M.D., C.I.E., Madras.*)

"The extract is used in cases of dropsy and gonorrhœa mixed with

the extract of white *rati.*" (*Surgeon W. Barren, Bhuj, Cutch.*) "The seeds are supposed to impair appetite and are given in the form of *congee* for excessive hunger." (*Surgeon-Major J. Robb, Ahmedabad.*) MEDICINE.

"It is useless in snake-bite." (*Surgeon V. Richards, Goalundo, Bengal.*) "I have tried this largely in the shape of a strong decoction in two-ounce doses in dropsy, especially of malarial origin, and found good results as a diuretic." (*Assistant Surgeon Debendro Nath Roy, Sealdah, Calcutta.*)

"If the bark of the root is mixed with an equal quantity (say five grains) of black pepper, it may be given in cases of intermittent fever with good results." (*Surgeon W. Wilson, Bogra.*) "The fresh juice of the leaves thickened into an extract by exposure to the sun and then mixed with a little opium, may be beneficially applied to primary syphilitic sores." (*Surgeon-Major Bankabehari Gupta, Purí.*)

"Several Native practitioners use the decoction as a diuretic in gonorrhœa and dropsical affections." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*)

Achyranthes ferruginea, *Roxb.;* Syn. for **Psilotrichum ferrugineum,** *Endl.*

A. incana, *Roxb.;* Syn. for **Ærua javanica,** *Juss.*, which see.

A. lanata, *Linn.;* Syn. for **Ærua lanata,** *Forsk.*, which see.

A. lappacea, *Linn.;* Syn. for **Desmochæta atropurpurea,** *DC.*, but by the *Genera Plantarum* it has been reduced to the genus **Papalia,** which see.

A. nodiflora, *Linn.;* Syn. for **Allmannia nodiflora,** *R. Br.*, which see.

A. prostrata, *Linn.;* Syn. for **Papalia prostrata,** *Mart.*, which see.

A. scandens, *Roxb.;* Syn. for **Ærua scandens,** *Mart.*, which see.

A. triandra, *Roxb.;* Syn. for **Alternanthera sessilis,** *R. Br.*, which see.

ACID. 391

Acids are chemical compounds of two or more elements, of which Hydrogen is generally one. A few compounds are known as acids, however, which do not contain Hydrogen, such as Silicic Acid (SiO_2) and CO_2 popularly known as Carbonic Acid. They may be referred to two great sections—acids which contain oxygen and hydrogen in combination with one or more elements, and acids which do not contain oxygen. They generally possess an acid taste, turn blue litmus into red, and neutralise the basic oxides, forming salts. When basic oxides form with water soluble hydroxides, these compounds are alkaline in their reactions and antagonistic to acids: they transform the acid red of litmus into the alkaline blue. An acid may be defined as a hydrogen compound, which has the power of combining with basic oxides to form salts by the partial or complete displacement of its hydrogen. In the commoner salts the basic principle is a metallic oxide. Conversely, salts are binary compounds or compounds composed of two principles, *viz.*, a basic oxide and an acid.

The reader is referred to works on chemistry for an account of the properties and uses of acids, a good many of which are now being prepared in India, and a large import trade exists in others.

ACIPENSER. 392

Acipenser huso, *Linn.;* PISCES.

THE SOURCE OF ISINGLASS. ISINGLA

Vern.—*Machchhi-ká-sirish,* HIND., DUK.; *Ghirriyus-samak,* ARAB.; *Sireshame-mahi,* PERS.; *Min-vajjaram,* TAM.; *Chepa-vajra mú,* TEL. 393

The name of the fish is *Sek máhr;* isinglass *is Serishom—Sek máhr.* (*Dr. C. Rice, New York.*)

A sturgeon inhabiting the Caspian and Black Seas.

The swimming bladder or sound is cut up into shreds forming the Isinglass of commerce. This is insoluble in cold water, but when boiled it is completely soluble, and on cooling forms a beautiful jelly. Fifteen grains of Isinglass are sufficient to form a consistence to one ounce of water.

MEDICINE. 394 **Medicine.**—It is demulcent and nutritive. It is also used as a test to distinguish gallic from tannic acid, the latter becoming yellow. As a substitute for isinglass see **Gracilaria lichenoides.**

A very extensive trade is done from India in what is known, in our Trade and Navigation Returns, as "Fish Maws and Shark-fins." During the year 1883-84 the exports under this head amounted to 1,612,014 cwts., valued at R11,23,254. How much of this could be said to be isinglass is impossible to ascertain. The imports are chiefly from Arabia, and the bulk of the exports are to China. The finer qualities of fish maws doubtless find their way into the isinglass market.

For further information see under "Fish Maws."

395 § "Indian isinglass, which is of very good quality, is got from a species of Polynemus. (*See Royle's pamphlet and Day's Fishes.*)" (*Deputy Surgeon-General G. Bidie, Madras.*) "In the last July sales of Mincing Lane 380 packages of East Indian isinglass were offered, comprising 192 cases Penang, 127 cases Bombay and Kurrachee, and 61 cases Saigon. Bombay *tongue*, good to fine, fetched from 3*s*. 5*d*. to 3*s*. 11*d*. per lb. The qualities in the market are: *1st Leaf, 2nd Tongue, 3rd Pipe, 4th Purse*. The *Purse* is worth 1*s*. to 1*s*. 6*d*. per lb. only. A reference to the Mincing Lane Reports will show that the isinglass of commerce is practically all East Indian (at any rate as far as the London market is concerned). The sales are sometimes over 500 packages at one sale. In the Indian Trade Returns isinglass is entered as "Fish Maws;" it is obtained from various kinds of large fish. The trade names depend upon the shape when dried. Russian and Brazilian isinglass would seem to have found another market." (*Surgeon-Major W. Dymock, Bombay.*)

396 ACONITUM, *Linn.; Gen. Pl., I., 9.*

A genus of perennial herbs (belonging to the Natural Order RANUNCULACEÆ and the Tribe HELLEBOREÆ), comprising about 180 species, inhabitants chiefly of the northern temperate zones, some seven species being met with on the Himálaya.

Leaves alternate, palmi-partite, rarely entire. *Flowers* irregular, racemed, blue, purple, white, or yellow. *Sepals* 5-petaloid, the *helmet* or posterior sepal convex or vaulted, the others flat, the two anterior ones being narrower than the lateral. *Petals* 2-5, the two posterior ones stalked, (*clawed*) *limb* hooded and formed somewhat in the shape of a hammer, concealed within the helmet; the three lower (or anterior petals) small or obsolete. *Stamens* many. *Follicles* 3-5, sessile. *Seeds* many, with a spongy, rugose, or wrinkled *testa*.

The word Aconitum is ἀκόνιτον, the classical Greek name being derived most probably from ἄκων, a dart, from its having been used to poison darts.

In connection with the subject of the poison used by the Aka hill tribes on the frontier of Assam, I had recently some correspondence with **Dr. Warden**, Professor of Chemistry, Calcutta. The roots which furnish the poison were identified by me as those of a species of Aconitum, most probably indigenous to the mountains bordering on Assam; in other words, they were not the Nepal Aconite which finds its way over the greater part of India. I had also the pleasure of examining a root said to be used by the Akas as an antidote against aconite poisoning. This proved to be the classical Costus root. In a private correspondence upon this subject with **Dr. Dymock** of Bombay, I received a most interesting

letter drawing my attention to the numerous references to this same property having been attributed to the Costus root (**Saussurea Lappa**). I take the liberty to extract a passage from this correspondence :—

"Regarding Costus, it was regarded by the Greeks, Romans, and Muhammadans as an antidote to poisons generally. **Dioscorides** says of it, *πινόμενος δὲ ὀυγγίας βπλῆθος, ἐχιοδήκτοις βοηθεῖ*; and again, *μίγνυταί δέ καὶ μαλάγμασι και ἀντιδότοις.*" *Celsus* 5·23, *de antidotis* has three receipts, in all of which Costus is an ingredient.

Mir Muhammad Hossein in the *Makhzan* says :—

یکمثقال آن با خمر و افسنتین تریاق سموم و جاذب آنها بسوی ظاهر جلد وجهت
رفع سم افعي و عقرب و رتیلا و امثال اینها از سموم قتاله نافع '

i.e., 'one miskal of it, with wine and wormwood, is an antidote to poisons and draws them to the surface of the skin. It is useful to counteract the poison of the viper, scorpion, and tarantula, and other deadly poisons.' Practically, the antidotes for aconite are diffusible stimulants: costus is a stimulant, and is given as such in cholera by the natives."

The subject of Aconite seemed deserving of a thorough investigation, both with the view of establishing a trustworthy supply of uniform quality for medicinal purposes, and, if possible, of checking the indiscriminate way in which the drug is placed within the reach of persons desiring to use it for criminal purposes. Accordingly, I recently addressed the Government of India, in the Department of Revenue and Agriculture, on this subject, submitting, along with some of the more interesting facts brought to light in connection with the Aka arrow poison, a suggestion to form a Commission of Enquiry. I take the liberty to republish a few passages from that communication :—

"The genus of plants which yields aconite belongs to the poisonous Natural Order Ranunculaceæ. The members of that genus are exclusively confined, as far as India is concerned, to the alpine and subalpine regions, chiefly occurring on the Himálaya from Nepal westward to Kashmír. There are in all seven Indian species known to botanists, with two or three varieties under two of these species. One contains no aconitia, *viz.*, **A. heterophyllum**, and is largely eaten as a vegetable or mild tonic. This species is perfectly well known. Of the other species, some are poisonous, others not, and even some of the varieties of one species are poisonous, while other varieties are not. The poisonous forms have never been accurately identified, and the result is, that of a given weight of the root sold in our druggists' shops, a certain percentage frequently contains no aconitia whatever; indeed, an entire consignment may be perfectly inert. This uncertainty renders the use of aconite objectionable, its action not being constant; while it is for many diseases, such as certain forms of malarial fever, and all skin diseases, the most valuable drug known. It is very much to be regretted that so valuable a medicine should thus suffer in consequence of ignorance, and I would, therefore, strongly recommend that a Commission of Enquiry be instituted with the object of determining the following points :—

"*1st.*—The scientific determination of the various species of **Aconitum.** Dried specimens of each species in flower should, for this purpose, be collected, with their roots attached, so that the characters of the roots of each individual species or variety may be determined and clearly described. Were this done, it might be possible to recognise the various forms of aconite sold in the bazars.

"*2nd.*—To chemically determine the average amount of aconitia in each

species, and perform a series of experiments in the cultivation of the various species with the object of ascertaining if there is a fixed average percentage, or whether different alkaloids or different proportions of alkaloids are characteristic of certain species. In other words, ascertain whether the presence or absence of aconitia is a specific peculiarity or a formation which may or may not take place within the tissue of an individual plant.

"*3rd.*—To endeavour to ascertain whether the percentage of aconitia can be increased by cultivation; and, if possible, to establish some source from which a constant supply might be obtained. I am not aware whether the Medical Store Department imports its aconite or not; but there does not seem the slightest reason why India might not supply the world with this most valuable medicine, and supply it in such a manner as to do away with the uncertainty which centres around the use of the drug at the present day. Perhaps it might be that the extermination of inert forms from certain limited racts of the higher Himálaya would be all that might be necessary, allowing thereby the aconitia-yielding forms to naturally become more prevalent. All the species are exceedingly plentiful on the alpine Himálaya from Nepal westward to Kashmír, one or two species finding their way eastward to Assam through Sikkim and Bhután.

"*4th.*—To ascertain the areas and statistics of production of the different aconite roots at the present time and the chief centres of exportation.

" In support of these recommendations, I beg to quote one or two of the numerous appeals which have appeared in European medical publications. **Dr. Cook**, in the *Year-Book of Pharmacy for 1873, page 21*, writes as follows: 'In this instance of an important drug involved in mystery, we see the necessity for some official medium through which to prosecute inquiry. Individual effort is insufficient, and the only effectual mode should emanate from the Government of India, to ascertain the areas and statistics of production of the different aconite roots in the Himálaya,—their value commercially on the spot, the native names applied to the different kinds, and the plants producing them properly and satisfactorily identified. Then, as a consequence, the different varieties will be analysed, and the value of each determined according to the amount of alkaloid present. This is but one out of scores, perhaps hundreds, of instances, in which information is required of a special character on the products of our vast Indian Empire, and which no private effort is capable of obtaining.' **Dr. E. R. Squibb** also writes in the same volume: 'Although but few drugs are apparently more cheaply and easily obtained than aconite root, yet perhaps in no other is there so great an amount of uncertainty, many parcels having been found to be comparatively worthless in a medical point of view.' "

In the *Admiralty Manual of Scientific Inquiry* (and republished in *Hanbury's Science Papers*, 187) occurs the following significant interrogation, which, strange to say, remains unanswered: " *Aconite root* has been imported in considerable quantities from India. In what district is it collected, and from what species of *Aconitum?*" This admission of want of definite information regarding the source of Indian aconite was made in 1871 by **Professor Oliver**, and the late distinguished scholar and pharmacologist **Daniel Hanbury**, and it has still to be answered before we can be said to possess any trustworthy data upon which to base a definite and accurate knowledge of what may be justly called India's most valuable indigenous drug.

The following are the principal Indian species with the information

which can be gathered regarding each from works on Indian Economic Science:—

Aconitum ferox, *Wall.; Fl. Br. Ind., I., 28.* 397

INDIAN ACONITE.

Vern.—*Bish, (bikh), bis,* (derived from the Sanskrit *Visha*), *bachnak, mithá-sahar, singyá-bis, singyá, téliyá-bis, bachhnág,* HIND; *Kat bish,* or simply *bish,* BENG.; *Bish,* ASS.; *Visha, vatsanábha,* SANS.; *Bish,* ARAB.; *Bishnág,* PERS.; *Bachnág,* MAR.; *Vachnág* or *vachha-nág,* GUJ.; *Buchnága,* CUTCH; *Vasha návi,* TAM.; *Vasanábhi, nábhi,* TEL.; *Valsanábhi,* MAL.; *Vasanábhi,* KAN.; *Vachanabhi,* CINGH.

It is probable that, under the above vernacular names, the majority of the poisonous forms of aconite are sold by our native druggists. Most authors, however, agree in regarding these as more properly belonging to this species. **Dr. Moodeen Sheriff** regards *Jadvár* as the only safe generic name for the species of medicinal aconite. The names *Singyi* or *singyá-bis* and *mítha-sahar* are applied to two forms of Aconite generally referred to this species. (See below.)

References.—*Pharm. Ind., 3 and 434; Flück. & Hanb., Pharmacog.; Bentl. & Trim., Med. Pl., 5; O'Shaughnessy's Bengal Disp., 165; Dymock's Mat. Med., W. Ind., 1; Drury's Us. Pl., 12; Royle's Mat. Med., Ed. by Harley, 776; Groves, in Year-Book of Pharm., 1870; 1873, p. 500; Moodeen Sheriff, Supp. Pharm. of Ind., 25, 32, 265; Cooke, in Pharm. Jour., Ser. 3, Vol. III., p. 563; Duquesnel, De l'Aconitine Crystal, Paris; and Pharm. Jl., Ser. 3, Vol. II., pp. 602, 623, and 662; Alder-Wright, Year-Book of Pharm., Report on the Aconites, 1st article in 1875, p. 514; 2nd, 1876, p. 531; 3rd, 1877, p. 444; 4th, 1878, p. 483; 5th, 1879, p. 417; 6th, 1880, p. 455; and 1881, p. 140.*

Habitat.—Temperate sub-alpine Himálaya, from Sikkim to Garhwál, altitude 10,000 to 14,000 feet.

Botanic Diagnosis.—*Stem* erect, 3-6 feet high, simple below. *Leaves* 3-6 inches, rounded, palmately 5-fid, cut into irregularly indented lobes. *Inflorescence* a terminal dense-flowered raceme, with only one or two branches below; *bracts* at the base of the peduncle leaf-like, smaller upwards, cut or lobed, two small ones usually about half way up the pedicel. *Flowers* on long erect stalks thickened above and glandularly pubescent, large, pale dirty-blue. *Helmet* about twice as long as high, vaulted, with a short sharp beak. *Follicles* 5, erect, usually densely villous and transversely wrinkled. *Seeds* having the testa pitted or plaited.

Differs from **A. Napellus** chiefly in the less divided leaves, denser flowered racemes, and shorter beak to the helmet.

MEDICINAL PROPERTIES.

Medicine.—The mass of the root sold in Indian druggists' shops as Aconite is derived from this species, but several others are no doubt used as substitutes or adulterants. **Dr. Bidie** says the root of **Methonica superba** is used as an adulterant in Madras. **MEDICINE. Singyi. 398**

Description of the Root.—Fusiform, 2-5 inches long and ½ to 1½ broad at the top. As sold in the bazars of India, it is often broken through the middle as if from carelessness in digging up, shrivelled longitudinally, and marked here and there with the scars of small detached rootlets. The colour of the dry root as sold by druggists is blackish brown; when broken the fractured surface is compact, hard, horny, somewhat translucent, and of various shades of brown. In the rainy season it becomes moist, and when handled stains the fingers brown. This is the *Singyi* or *singyá-bis* (horny poison) of the Hindús, the *sringí* poison of the Sanskrit authors.

Dr. Dymock (as also most other writers) has described another form of Indian aconite attributed to this species, *viz.,* with white spongy roots, and **Mitha-Zahar. 399**

ACONITUM ferox.

Indian Aconite.

Chemistry.

known in Bombay as "Lahore *Bachnáb*." This is the *mithá-zahar* (sweet poison) of the older writers. It is generally 1 to 1½ inches long, tapering, compressed, rough and wrinkled. Brown externally, much paler internally than the preceding. This form is said by some authors to contain more aconitia than the brown horny variety; by others it is regarded as decidedly inferior in strength. It is also devoid of the peculiar smell of the former, which resembles hyraceum or castor. It seems probable that this smell, as also the peculiarity of staining the fingers when moist, is due to some mode of drying and rendering the root proof against the attacks of insects, rather than a specific property of the root. For this purpose the roots are often dried over a fire, boiled in cow's urine or milk, preserved in oil, &c. A similar practice prevails in Japan, where the roots of an aconite are said to be preserved in child's urine.

The specific identity of these two forms appears open to grave doubt, however, and, indeed, the chemical nature, structural characteristics, and the association with Lahore would seem to suggest that the white spongy root was much more likely to be obtained from **A. Lycoctonum**—a species plentiful on the north-west Himálaya from Kumaon to Kashmír—than from **A. ferox.** The latter is the characteristic species of the eastern Himálaya, and nowhere occurs west of Garhwál. Being the root of a temperate plant, the "Lahore *Bachnáb*" most probably comes from Kashmír and the surrounding mountains (where **A. Lycoctonum** at altitude 7,000 to 10,000 feet, and **A. Napellus** at 10,000 to 15,000, are very plentiful); indeed, the latter species is one of the commonest plants on all the higher Himálaya from Kumaon westward, but is not met with in the region of **A. ferox,**—the eastern Himálaya.

In European commerce all the Indian forms of aconite are classed as forms of **A. ferox.** This seems an unfortunate mistake, the more so, since it is by no means the most plentiful, and certainly not the most accessible, species. It may be quite wrong to limit the dark-coloured form to **A. ferox,** but it seems only natural to expect that, should the suggestion to form a Commission of Enquiry into Indian aconite be acted upon, we shall be able to refer the numerous forms met with in commerce to distinct species. Indeed, we shall very likely discover that **A. Napellus** supplies a far larger proportion of our Indian Aconite than we had any idea of before.

Chemical Composition.

400 The roots of this species contain, relatively to the roots of the other species of aconite, a much larger amount of *Pseudo-aconitine* ($C_{36}H_{49}NO_{12}$) (or *Nepaline*), a much smaller quantity of *Aconitine* ($C_{33}H_{43}NO_{12}$), and an amorphous alkaloid analogous to, but not identica with, that found in **A. Napellus.** This alkaloid is non-crystalline, and yields non-crystalline salts. **Wright** considers pseudo-aconitine as nearly related to the opium alkaloids narceine, narcotine, and oxy-narcotine, which, like pseudo-aconitine, all give rise to derivatives of dimethyl-proto-catechuic acid. Napelline (or Nepaline, or pseudo-aconitine) was discovered originally by **Hübschmann** in 1857. It is a white powder, in the form of transparent needle-crystals, with a bitter burning taste, having a strong alkaline reaction, forming with difficulty crystallizable salts. It is readily soluble in water, alcohol, or chloroform, but insoluble in ether. According to **Prof. Flückiger** the most characteristic features of pseudo-aconitine, separating it from Aconitine proper, is the absence of bitterness and its ready solubility in water. The physiological properties of this alkaloid have been carefully investigated by **Bœhm** and **Ewers,** who state that it exerts an influence similar to that of aconitine, except that it is more powerful. It has entered largely into the composition of English commercial acon-

MEDICINE.

itine (aconitia) owing to the Nepal aconite being so largely used in the preparation of that alkaloid. (Conf. with chemistry of the compounds derived from **A. Napellus.**)

Until the suggestion contained above regarding the black, horny, and white spongy roots has been proved correct by original investigation of the living plants, it would, perhaps, be unwise and prove confusing to depart too far from the universally accepted notion that they are both forms of **A. ferox.** **Dr. Royle**, in his *Materia Medica* (*Ed. J. Harley*), says: "**Dr. Headland** found in several experiments, the results of which were uniform, that while from 54 to 56 grains of aconitia could be obtained from one pound of the horny root, 88 to 96 grains were extracted from a pound of the friable root."

Medicinal Uses.

The root is commonly regarded as much more powerful than that obtained from **A. Napellus.** On this account it is chiefly recommended in the manufacture of preparations to be used externally. Experimenting with the poisonous properties of the aconites, **Ewers** discovered that the root of **A. ferox** is much more virulent than **A. Napellus.** By the natives of India the *bish* (as sold in the bazars) is used extensively, both externally and internally, but owing to the want of definite knowledge regarding the species which afford this drug, much of what has been written by the older authors, or, indeed, can at present be written regarding it, may have to be rearranged and placed under other species.

It is a very effective medicine in various diseases, acting as a narcotic sedative, regarded as heating and stimulant, useful in fever, cephalalgia, affections of the throat, dyspepsia, and rheumatism. *Bish* appears to have been known to the Hindú doctors from the earliest ages. It is much used as an external application, the root being formed into a paste (*lép*) and spread upon the skin in neuralgia, boils, &c. Internally, it is chiefly used in the treatment of chronic intermittent fevers (*Dymock*). Europeans use it as a substitute for true aconite. In a recent correspondence between the leading members of the Indian Medical Department and the Government of India, several Provincial Committees and distinguished officers recommended that this root should be substituted for **A. Napellus** in the officinal preparations. The Bombay Committee recommended that this should be done chiefly with external remedies, adding that "it must not be used for internal administration in the same doses, the alkaloid *Nepaline* being much more powerful than the aconitine of **A. Napellus.**" Its therapeutic uses are also defined "externally to relieve neuralgia, rheumatism, gout, &c.; internally, to control the action of the heart when increased by disease, and to relieve pain in rheumatism. In native practice *Bachanága* is used in combination with cinnabar, sulphur, borax, and aromatics, in extremely small, almost homœopathic, doses, in intermittent fevers and common coughs, with considerable success." (*Brigade Surgeon H. V. Carter, President, and Surgeon-Major W. Dymock and Assistant Surgeon Sakhárám Arjun, Members of Committee, Bombay, 20th May 1879.*) Before, however, the bazar aconite is substituted for the aconite of European commerce, it seems highly desirable that the identity of the Indian forms be thoroughly established, and, if possible, some arrangement made by which a full and uniform supply of the best Indian article may be ensured.

Special Opinions.—§ "The root is very useful in the form of liniment in cases of neuralgia and muscular rheumatism." (*Surgeon S. H. Browne, M.D., Hoshangabad, Central Provinces.*) "Tonic and antiperiodic (dose $\frac{1}{60}$ to $\frac{1}{30}$ grain). Used by hakims in the form of pills called *anand*

chairawa, which are made up of sulphide of mercury, *buchnága*, *tankana*, *khar*, *pimplee*, and mucilage (gum)." (*Surgeon W. Barren, Bhuj, Cutch.*)

"I have tried it and found it utterly useless in cobra poisoning. Indeed, without having any influence whatever upon the lethal effects of cobra poison, in fact it certainly very much increased the severity of one of the most marked symptoms of cobra poisoning, *viz.*, salivation. It would appear to be an aphrodisiac of some power. I believe it to be a very poor substitute for true aconite." (*Surgeon V. Richards, Goalundo, Bengal.*)

"An oil is extracted from the root and used for rheumatism as an external application." (*Surgeon-Major J. Robb, Ahmedabad.*)

"Used by natives in fevers attended with constipation; it enters in the composition of purgative pills, containing cinnabar and Indian calomel, otherwise called '*Rasacurpooram.*'" (*Surgeon-Major J. F. Fitzpatrick, M.D., Coimbatore.*)

"The fresh root is given in small quantities internally in gonorrhœa." (*Surgeon-Major D. R. Thompson, M.D., C.I.E., Madras.*)

"Found growing wild in Kalahandi on hilly places, used by the Khonds to poison their arrows." (*Assistant Surgeon Shib Chunder Bhattacharji, Chanda, Central Provinces.*)

"**Aconitum ferox.**—There are several varieties of aconite root met with in Southern India, the most common of which are those which, according to their colour or taste, are known as the *white* or *sufed-bachnág*, the *reddish brown* or *lál-bachnág*, the *black* or *kála-bachnág*, and the *sweet* or *mítha-zahar*. The white and reddish-brown varieties can be used internally. They are very useful as sedative, nervine, and alterative tonics in medicinal doses, but a virulent poison in large ones. A few years ago I took the white variety myself in small quantities, and found that its internal use is not attended with more danger than that of the European drug (**A. Napellus**). Since that period I have employed it very extensively in my practice, and do not hesitate in saying that it is one of the most useful medicines in India. Its beneficial influence over diabetes is very remarkable, the immoderate flow of urine beginning to diminish from the very day of its use, with a proportionate decrease in the saccharine matter. Its control over spermatorrhœa and incontinence of urine is equally great. It has lately been found useful in some cases of paralysis and leprosy. The advantages of this drug over all other varieties of the Indian Aconite root are that it is not only much milder but also more certain and uniform in its actions. The white and hard variety which I am speaking of is quite different from the white and spongy variety mentioned in some books. I have also used the reddish-brown variety pretty extensively, and with almost the same results. The above roots are best used in the form of powder with some inert or farinaceous substance, as follows: Take of the white or the red variety of the aconite root in powder, one ounce; arrowroot or wheat-flour, seven ounces. Mix them thoroughly, pass the powder through a fine sieve and rub it lightly in a mortar and keep it in a bottle. The roots can also be employed in the form of tincture, but the powder I have just described was so convenient and cheap, and proved so successful, that I did not think it necessary to resort to any other form. The dose of the powder is from two to six grains, gradually increased, three times in the twenty-four hours; the average and usual dose being four grains." (*Honorary Surgeon Moodeen Sheriff, Khan Bahadur, Madras.*)

"Said by hakims to be useful in large doses, along with stimulants, in cases of snake-bite and scorpion-stings; it is aphrodisiac. Very useful for reducing the temperature in fevers." (*Surgeon G. A. Emerson, Calcutta.*)

"Antiperiodic, alterative, and expectorant, used as a nervine tonic in cases of paralysis. Used as an external application to chronic sores.

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Natives prepare it by boiling the root in milk for half an hour, repeating this process seven times, and afterwards pulverise. This process is said to reduce the poisonous effects of the drug. Dose $\frac{1}{10}$ to $\frac{1}{16}$ of a grain." (*Surgeon J. McConaghey, Shahjahanpur.*) "A very useful anodyne liniment is prepared by heating an ounce of coarsely-powdered aconite root in half a seer of linseed oil." (*Assistant Surgeon Mokund Lal, Agra.*) "Said to be used in bronchitis and asthma; no personal experience." (*Surgeon J. Parker, Poona.*)

"While serving at Buxa, Bhután, a woman attempted to poison her husband by means of the root given in a curry. The symptoms were well marked, but he recovered." (*Surgeon L. Cameron, Nuddea.*) "A tincture of this drug acts like the true aconite, hence it is admissible in inflammations and fevers like the European drug." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) "Useful not only in chronic but in acute intermittent fever, during the hot stage, also in continued fever, as well as in all neuralgic affections. (*Brigade Surgeon S. M. Shircore, Moorshedabad.*)

Aconitum heterophyllum, *Wall.; Fl. Br. Ind., I., 29.* 401

Syn.—A. CORDATUM, *Royle;* A. ATEES, *Royle.*

Vern.—*Atis, atvíká,* HIND., BOMB.; *Ataicha, ativishá,* SANS.; *Vajjeturki,* PERS.; *Ati-vadayam,* TAM.; *Ati-vasa,* TEL.; § "*Mohand-i-gúj saféd, hong-i-saféd,* KASHMIR; *A'is,* BHOTR" (*Dr. Aitchison*); *Sukhihari, chitijari, patris,* or *patis, bonga,* PB.; *Atavishni-kalí, ativish* or *ativakh,* GUJ.; *Atavish,* MAR. (*Assistant Surgeon Sakharam Arjun Ravat, Bombay*); *Ativista,* CUTCH.

Moodeen Sheriff cautions the use of the term *ati-visha* (*ati,* great, and *visha,* a poison) as applied to this plant, and thinks that it should be restricted to the poisonous forms. The Telegu name *Ati-vasa* (*Ati,* great, and *vasa,* the sweet-flag) is given in allusion to its supposed resemblance to the rhizomes of **Acorus Calamus.** The Arabic word *Jadvár* is the only safe one in ordering the non-poisonous forms of aconite, much safer than the Hindustani *Nirbisí* (*Nir,* free from, *bisi,* poison), because of the latter having been applied by modern usage to many other things (*conf.* **Curcuma.**)

References.—*Royle's Ill., 56, t. 13; Bentl. & Trim. Med. Pl., 7; Flück. and Hanb., Pharmacog., 14; Pharm. of Ind., 4; O'Shaughnessy's Beng. Disp., 167; Dymock's Mat. Med., W. Ind., 4; Alder Wright,* in *Year-Book Pharm., 1879, 422; Agri.-Hort. Soc. of Ind. (1857), XVI., Sec. I., p. 311.*

This is apparently **Caltha Nirbisa,** *Ham.,* and **Nirbisia Hamiltonii,** *Don;* it is most probably the species of Aconite to which the vernacular *Nirbisia* belongs. **Hamilton** says it is in Nepal called *Nirbishí* or *Nirbechí.* (See the concluding para. upon adulteration.)

Habitat.—West temperate Himálaya, from Kumaon to Hasora, altitude 8,000 to 15,000 feet, very plentiful in the neighbourhood of Simla; very common on the Sach Pass, Chumba, along with **A. Napellus.** Altitude 7,000 to 15,000 feet.

Botanic Diagnosis.—*Stem* erect, leafy, 1-3 feet, simple or branched from the base, glabrous below, puberulous above. *Leaves* 2-4 inches, broad ovate or orbicular-cordate, more or less 5-lobed and toothed (inciso-crenate), acute or obtuse; upper shortly stalked or sessile, not lobed, amplexicaul, thick, bright green, pale beneath, lower long-petioled. *Raceme* often panicled, many-flowered. *Flowers* on long rufous-pubescent peduncles, more than an inch long, bright blue or yellow-greenish with purple veins; *helmet* shortly beaked, half as high as long. *Follicles* 5, downy. *Seeds* angled but with a smooth testa. In form of leaf it varies considerably, hence the specific name **heterophyllum.**

Description of the Root.—Ovoid-conical, tapering to a point from ½ to 1½ inch long, and ¼ to ½ or more thick. Externally light ash-coloured, wrinkled and marked with the scars of the fallen rootlets, with a rosette of scaly

rudimentary leaves on the top. A transverse section shows the root to consist of a pure white, friable, amylaceous substance, marked towards the centre by from 4 to 7 concentrically arranged yellow dots corresponding to the ends of the fibro-vascular bundles which traverse the root longitudinally. In taste the root is simply bitter with no acridity. It has no odour, and may be distinguished from other roots by its bitterness and absence of tingling sensation when a small portion is eaten.

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CHEMICAL COMPOSITION.

The composition of this root has not by any means been thoroughly established, but it may be stated that **Broughton** first succeeded in separating what appears to be its active principle, *viz.*, the amorphous alkaloid to which he gave the name *Atisine* and assigned the formula $C_{46}H_{47}N_2O_5$. The exact composition of this alkaloid cannot, however, be said to have been determined as yet, and in the *Year-Book of Pharmacy for 1879*, **Wright** suggests a correction upon **Broughton's** formula as likely to be soon established. He percolated a powdered dry root with alcohol containing a little tartaric acid, and evaporating the percolate, he obtained ultimately **Broughton's** alkaloid atisine. This was uncrystallizable, but with hydrochloric acid and gold chloride, he obtained a crystalline hydrodichloride $C_{22}H_{31}NO_2HCl, AuCl_3$ from which he suggests that $C_{22}H_{31}NO_2$ may prove nearer the correct formula for atisine than that given by **Broughton.**

Aconitine has not been found in the *atís* root, or only in very minute quantities, and atisine is not poisonous; it tastes intensely bitter, without the slightest tendency to produce the tingling characteristic of the aconite alkaloids. **Wasowicz** states that it contains the following: (1) a fat, probably a mixture of oleic, palmitic, and stearic glycerides; (2) aconitic acid; (3) an acid related to tannic acid; (4) cane-sugar; (5) vegetable mucilage; (6) pectous substances; (7) atisine; and (8) starch. It contains $\frac{8}{10}$ of 1 per cent. atisine.

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Grey Roots.
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MEDICINAL USES.

The ROOT is pleasantly bitter, and is regarded as a valuable, mild antiperiodic, aphrodisiac, and tonic, checking diarrhœa. It may be administered internally with safety owing to the absence of Aconitia or other poisonous properties. It is specially useful in convalescence after fever. As a tonic the dose is 5 to 10 grains, three times daily, and as an antiperiodic from 20 to 30 grains of the powdered root every three or four hours.

Special Opinions.—§ "The white or common variety of the root of **A. heterophyllum** is a very useful antiperiodic and antipyretic, but to ensure its best effects it is required to be administered in its full medicinal doses, which are, according to my own experience, from one to two drachms. It is quite safe up to two drachms and a half. In smaller doses (twenty to forty grains) it is a good tonic, but its action as an antiperiodic is very feeble." (*Honorary Surgeon Moodeen Sheriff, Khan Bahadur, Madras.*)

"This drug has never produced any substantial benefit in my hands. I am satisfied it possesses no curative value. I have abandoned the use of it. Any benefit derived while it was used might with equal accuracy be set down to *time* and the *vis mericatrix naturæ*, of which I had ample evidence in my practice." (*Brigade Surgeon W. R. Rice, M.D., Jubbulpore.*)

"I have found *atís* an uncertain antiperiodic, although acting well in some cases, especially in mild agues. It requires to be administered in large doses, frequently repeated, during the intervals of the fever." (*Surgeon S. H. Browne, M.D., Hoshangabad, Central Provinces.*)

"Formerly was largely used in Hyderabad (Deccan) as an antiperiodic in mild fevers." *(Deputy Surgeon-General G. Bidie, C.I.E., Madras.)* **MEDICINE.**

"I used this in Government out-door dispensaries in large doses (20 to 40 grains) as an antiperiodic in simple intermittent fever, but cannot speak very favourably of it." (*Assistant Surgeon Debendra Nath Roy, Sealdah, Calcutta.*)

"Valuable antiperiodic, formerly largely used in out-door dispensary in intermittent fevers. *Dose* of powdered root half a drachm." (*Assistant Surgeon Shib Chunder Bhattacharji, Chanda, Central Provinces.*) "Antiperiodic and tonic, *dose* 1 to 5 grains of the powder." *(Surgeon W. Barren, Bhuj, Cutch.)* "I have largely used it in ten-grain doses as an antiperiodic in intermittent fevers and as a febrifuge in five-grain doses in slight cases of fevers with benefit, but I could not depend on it in cases of remittent fever." (*Assistant Surgeon Bollye Chand Sen, Teacher of Medicine.*) "White *atís*, if from ½ to 2 grains of ipecacuanha is added to each dose, is useful as a febrifuge." (*Surgeon-Major John North, Bangalore.*) "*Atís* powder used as an antiperiodic. It does not cause sickness." (*Surgeon J. Ffrench Mullen, M.D., Saidpur.*) 405

"Used in chronic diarrhœa and dysentery, with other astringents." (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*) "Given internally it is said to be useful in boils." (*Surgeon G. A. Emerson, Calcutta.*) "Is a fairly good febrifuge, can be obtained in the bazars, and may be used when other bitter drugs are not available." (*Assistant Surgeon Nehal Singh, Saharanpur.*) "This is a good febrifuge and obtainable in the bazars of Umballa, Panjáb." (*Brigade Surgeon R. Bateson, Umballa.*) "Appears to be efficacious in mild intermittent fever, but less so than the cinchona alkaloids." (*Assistant Surgeon Jaswant Rai, Mooltan.*)

"Febrifuge and tonic, used as a substitute for quinine. *Dose* of the powder 10 grs. with 3 grs. of *Heera kus* (Ferri. sulph.)." (*Surgeon C. M. Russell, Sarun.*) "An indifferent antiperiodic, used in dispensary practice on account of its cheapness; very much inferior to cinchona preparations." (*Surgeon G. Price, Shahabad.*) "In mild fever 5 to 10 grain doses of the powdered root have been found antiperiodic. In convalescence it may be given with advantage, in combination with iron, ginger, &c. The infusion of root has been tried, but not found so efficacious as the powder." (*Surgeon E. S. Brander, Rungpur.*) "I tried this medicine extensively in the epidemic fever of Burdwan and elsewhere. It certainly possesses antiperiodic virtues in larger doses, 30 to 40 grains. It can only be used in mild intermittent fevers when cinchona alkaloids or arsenic are not procurable." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) "Very efficacious in the acute stage of dysentery, with febrile symptoms. Good for ordinary malarious fever in doses of 10 grains, given every three hours, during the remission." (*Dr. Forsyth, Civil Medical Officer, Dinajpore.*) "*Atís*, in doses of gr. xxx, three times a day, is a useful antiperiodic in intermittent and other periodic fevers. It is also a valuable tonic in cases of debility." (*Brigade Surgeon J. H. Thornton, B.A., M.B., Monghyr.*) 406

The numerous opinions received regarding this drug are fairly represented by those published above. The remainder are so uniformly to the same purpose, if not exactly in the same words, that it has not been considered necessary to publish more than the selection given.

Adulteration and Substitution.—The root is said by **O'Shaughnessy** to be adulterated with that of **Asparagus sarmentosus** (*satamuli*). Two kinds of the root are met with in the market—(*a*) grey, shrivelled tubers, larger and longer than (*b*) white, the daughter off-shoots broken from the former. The latter fetch the best price. They are slightly scarred from the abrasion of rootlets, are generally 2 inches long, with a thin tap-like extremity, often bifurcated. They should break with a short, starchy **Adulterants.** 407

fracture, presenting a white surface (*Dymock*). The *atís* is eaten fresh by the hillmen of Kanáwár as a mild tonic.

408 **Dr. Buchanan**, who first made known the various forms of Aconite, referred them to the genus **Caltha**, but **Don** early corrected this mistake by forming them into a new genus to which he gave the unhappy name Nirbisia (the antidote) in honour of the vernacular name *Nirbisí* applied to one of **Dr. Buchanan's** plants. **Wallich** subsequently referred these plants to their correct genus, **Aconitum.** Much confusion still exists as to the true *Nirbisí*, for it is by no means clear that it is a pure synonym for *Jadvár*, the generic name for the non-poisonous forms of the Aconite root. The following plants have been also mentioned as bearing the vernacular name *Nirbisí:* **Curcuma aromatica**, *Salisb.*, **C. Zedoaria**, *Roxb.*, which **Colebrooke** regarded as the Zedoary of the ancients from its synonyms being *Jádwár* and *Zadwár*. **Dr. Royle** states that the roots of **Delphinium denudatum**, *Wall.* (**D. pucifiorum**, *Royle*), bear the name *Nirbisí*. In **Dr. Dymock's** *Glossary of the Bombay Plants and Drugs*, *Nirbisee* is given as the Deccan name for **Cissampelos Pareira. Dr. Dymock** has, however, drawn my attention to the fact that **Prof. Rudolph Roth**, the distinguished Sanskrit scholar, has identified the roots of **Kyllingia monocephala**, *Linn.*, as the *Nirvisha* of the Sanskrit writers. This agrees with **Roxburgh's** remark under **Kyllingia**, where he gives the Bengali of this plant as *Swetagothubi*, remarking that *Nirbishee*, its fragrant aromatic root, is accounted an antidote to poison. **Dr. Moodeen Sheriff, Khan Bahadur**, distinguishes between the words *Nir-bisí* (a synonym for *Jadvár*) and the Sanskrit expression *Nir-visham* or *Nirvisha*, which expression he says means antidote. He concludes his remarks by urging that great care should be shown in prescribing the forms of Aconite under their vernacular names, and he regards *Jadvár* as the only name which can with safety be used for the non-poisonous forms.

409 **Dr. Aitchison**, in a note published under **A. palmatum**, says that the word *Nirbisí* is in the Panjáb applied to a poisonous form of aconite root. By most authors it is applied to **A. heterophyllum** only; by others (as it would appear with more correctness) to the non-poisonous forms of aconite (**A. heterophyllum** is known as *atís*), the non-poisonous forms being regarded as antidotes to poisons generally, hence the name *Nir-bisí*. It seems probable, however, that this name has become associated with many antidotes, and may, indeed, have originally been applied to a quite distinct plant, such as the roots of **Kyllingia.** (Conf. with non-poisonous forms of **A. Napellus**).

410 **Aconitum luridum,** *H.f. & T.; Fl. Br. Ind., I., 28.*

Habitat.—Sikkim, altitude 14,000 feet.

Botanic Diagnosis.—*Stem* erect, simple. *Leaves* palmately 5-fid below, the middle segments cuneate-ovate, 3-fid, coarsely crenate. *Racemes* ½ to 1 foot, simple, pedicels short. *Flowers* dull red; *helmet* with a long, straight beak, and broad, dome-like, dorsal prominence. *Seed* with a smooth testa. No information regarding the economic uses of this species.

411 **A. Lycoctonum,** *Linn.; Fl. Br. Ind., I., 28.*

Habitat.—The temperate Western Himálaya from Kashmír to Kumaon, altitude 7,000 to 10,000 feet. *Distrib.*—Europe and North Asia.

Botanic Diagnosis.—*Stem* erect, much-branched, 3-6 feet, glabrous or pubescent. *Leaves* 6 to 10 inches diameter, palmately and deeply 5-9-lobed; *lobes* cuneate-ovate, sharply cut, lower on long peduncles, upper sessile. *Racemes* long-branched, tomentose; *bracts* minute. *Flowers* pale yellow or dull purple, variable in size; *helmet* with a short beak and long

cylindrical or conical dorsal prominence. *Follicles* 3, spreading. Seeds with plaited testa.

No definite information exists in India regarding the economic uses of this species; but it has been suggested under **A. ferox** that this may afford part of the Indian aconite.

Medicine.—By most botanists in Europe this is regarded as the species to which the various forms of Japanese aconite (**A. japonicum**, *Thunb.*) are most nearly related. It was first chemically analysed by **Hübschmann**, who is said to have extracted two alkaloids. These he named *Acolyctine*, a white powder insoluble in ether but soluble in water and alcohol, *Lycoctonine*, a crystallizable substance, very soluble in alcohol but only slightly so in water and ether. He subsequently came to regard acolyctine as identical with napelline. **Prof. Flückiger** regards this alkaloid as quite distinct from aconitine and pseudo-aconitine, and much less poisonout than either. **Dragendorff** has shown that **Hübschmann's** two alkaloids are but decomposition products of the true alkaloids present in the root of this species. He gave the name *Lycaconitine* to the alkaloid soluble in ether; it differs from every other known alkaloid, being richer in nitrogen. The alkaloid extracted by chloroform **Dragendorff** called *Myoctonine*; it is quite distinct from *acolyctine*. (*Pharm. Journ., 1884, 104.*) MEDICINE. Japanese Aconite. 412

At the same time **Wright** considers that he has discovered a new base from Japanese aconite, which he has called *Japaconitine* ($C_{66}H_{88}N_2O_{21}$), which is said to be even more poisonous than the aconite alkaloids.

It is probable that this species and also **D. paniculatum** (both frequent upon the Alps) yield much of the aconite of European commerce.

Aconitum Napellus, *Linn.; Fl. Br. Ind., I, 28.* 413

This is the true MONKS'-HOOD OR WOLVES'-BANE ACONITE.

Vern.—*Dudhiabish, kátbish, mithá-sahar, tilia cachang, mohri*, KASHMIR and PANJAB HIMALAYAN NAMES. (§ "*The root of this plant is in Kashmir called Ban-bal-nág.*" (*Surgeon-Major J. E. T. Aitchison, Simla.*) *Vasa nabhi* (*Surgeon-Major E. Levinge, Rajmundry*), TEL.; *Dudhio vachhanág* (*Assistant Surgeon Sakharam Arjun Ravat*), GUJ.

References.—*Pharm. Ind., 1; Flück. and Hanb., Pharm., 8; Bentl. & Trim., Med. Pl., 6; U. S. Dispens., Ed. 15th, 126; Bentley in Pharm. Jour., XV., 18 Ser., 449; Royle, Mat. Med., Ed. Harley, 773; Groves, Year-Book of Pharm., 1873, 500; 1874, 507; Wright's Reports on his experiments with Aconite, Year-Book of Pharm., 1875, 514; 1876, 531; 1877, 444; 1878, 483; 1879, 417; 1880, 455; 1881, 24; 1882, 223.*

Habitat.—Temperate alpine Himálaya, from 10,000 to 15,000 feet (Sach Pass, Chumba, *Watt*), ascending in stunted alpine forms to the highest limit of vegetation in the North-West Provinces. *Distrib.*—Temperate and Arctic Europe, Asia, and America.

Botanic Diagnosis.—A herbaceous perennial with short fleshy roots. *Stem* erect, simple, 2-4 feet high, smooth, green, slightly hairy above. *Leaves* variable in size, on long petioles, spreading, deeply, palmately, cut into 5 or 3 segments; *segments* linear, deeply and irregularly multifid, dark green above, pale beneath. *Racemes* simple, few or many flowered, sometimes with one or two smaller racemes at the base; *bracts* entire or 3-fid. *Flowers* large (¾ to 1 inch), stalked, erect; pedicels downy, thickened at the end with two small bracts on the apex close to each flower, bright blue or dull greenish-blue. *Helmet* shallow, 3 times as long as high, tapering to a slender beak. *Follicles* 3-5, generally hairy. *Seeds* with a smooth testa.

The *Flora of British India* refers the forms of this species to four varieties, as follows:—

Var. 1, Napellus proper: *Stem* 2-3 feet, leafy; *raceme* dense-flowered. *A poisonous form.* 414

Monks'-hood Aconite.

415 **Var. 2, rigidum** : *Stem* 2-3 feet, few-leaved; *leaves* firm, sub-coriaceous, with spreading, falcate, sharp teeth; *racemes* lax, few-flowered, tomentose. *A poisonous form.*

Syn.—A. DISSECTUM, *Don, Prod. Nepal, 197; Royle, Ill., 54;* A. FEROX, *Wall., Plant. As. Rar., t. 41.*

416 **Var. 3, multifidum** : *Stem* 6-12-inch, erect or decumbent, few-leaved, *leaves* 1 to 2 inches in diameter, many-lobed to the base; *lobes* cut into linear segments; *racemes* lax, few or many flowered. *Eaten by Bhotias.*

Syn.—A. MULTIFIDUM, *Royle, Ill., 56;* A. OLIGANTHEMUM, *Kern.*

417 **Var. 4, rotundifolium** : Like var. 3, but leaves not divided to the base. *Eaten by the Bhotias.*

Syn.—A. ROTUNDIFOLIUM, *Kar.;* A. TIANSCHANICUM, *Osk. & Rupr.*

The above sub-division into poisonous and non-poisonous varieties has been republished here in the hope that persons who may have the opportunity of examining the forms of this plant may be able to confirm the curious fact that some of the varieties of a species are poisonous while others are wholesome. I strongly suspect that the *Bikhma* of Nepal, referred, by most authors, to **A. palmatum**, may prove one of the edible forms of this species, and that it may be found to be the same as the *Nirbisí* or *Jadvár* of other authors. **Dr. Buchanan**, in his account of the Kingdom of Nepal, includes *Bikhma* as one of the four forms of aconite met with by him, **Dr. Dymock** says it reaches Bombay from the North, and that its value is R2-6 per lb.; that it is a valuable tonic of bitter quality, but resembling the *atís* root in its chemical properties and therapeutical actions. See also **A. palmatum** and **A. heterophyllum**.

Bikhma. 418

Nirbisi. 419

Properties and Uses—

MEDICINE. Root. 420

Description of the European Medicinal Root.—Usually from 2 to 4 inches long and ½ to 1 inch thick at the top, tapering, shrivelled longitudinally, and beset with the prominent scars of fallen rootlets; externally blackish brown, internally composed of a whitish, farinaceous substance. It breaks with a short fracture, is sometimes hollow in the centre. The transverse section of a sound root shows a pure white central pith, many-sided, with a fibro-vascular bundle at each of its angles. The fibro-vascular tissue is devoid of true ligneous cells, its tissue being chiefly composed of uniform parenchyma, loaded with starch granules. A minute portion chewed causes prolonged tingling and numbness of the lips and tongue. It tastes at first sweet, but soon becomes alarmingly acid.

In the fresh state the root has the odour of the radish, a peculiarity which disappears on drying. It has been mistaken for horse-radish, and is said to have caused the death of many persons who have eaten it by mistake for that root. This accident could only occur in winter when the leaves have faded and the roots been dug up leafless. But even then there should be no mistake. The root-stock of the horse-radish is much larger than the Monks'-hood; it does not taper like the latter plant, is pale-yellow coloured, and the crown marked by transverse scars indicating the positions of the old leaves. The aconite has not the sharp pungency of the horse-radish, and the scrapings will be observed to turn rapidly red, while the tingling sensation of the lips on biting the root should prevent fatal accidents.

It has been found by experiment that the proper season to dig up the root for medicinal purposes is in autumn when the plant is leafless. The two new roots occur on either side of the old one. The tincture and principal medicinal preparations used in European practice are prepared from the root.

Monks'-hood Aconite. ACONITUM Napellus.

MEDICINE. Leaves. 421 Herb. 422

Leaves and Herb.—In European practice the fresh leaves, and, indeed, the whole herb, are also used as medicine. The inspissated juice forms the *Extract of Aconite* of our European druggists. This preparation, which is somewhat uncertain in its action, is sometimes prescribed to relieve the pains in rheumatism, inflammatory and febrile affections, neuralgia, and heart-disease. Aconite herb was introduced into the London Pharmacopœia in 1788.

Chemical Composition.—Under **A. ferox** and **A. heterophyllum** a good deal has been already said regarding the results of recent chemical analyses of the various aconites. It may be stated that we are on the eve of dispensing with the aconite drugs now in use, which, owing to the uncertainty of the root used in their preparation, could never be depended upon. The chemical constituents of the more important aconites have recently been finally determined and their active principles or alkaloids extracted in a definite and crystalline form. The officinal aconite preparations of the future may be expected to contain a chemically fixed amount of the alkaloid, and their reactions will thus be perfectly trustworthy. For this invaluable result we are mainly indebted, in the first instance, to **Groves** and **Duquesnel**, perfected by **Alder—Wright** and his collaborateurs.

Formerly, by means of rectified spirit, water, ammonia, ether, and sulphuric acid, an amorphous powder was extracted from the roots of **A. Napellus**, known as Aconitia. But as the result of the researches of the distinguished chemists whose names are associated with this subject, it has been shown that the substance extracted from **A. Napellus** consists of two distinct compounds, *viz.*, *Aconitine* (proper)—a crystallizable alkaloid—and two non-crystalline bases, of which *Picraconitine* may be mentioned.

Aconitine or Aconitia, $C_{33}H_{43}NO_{12}$—This compound crystallizes in an anhydrous condition; melts at 183°C. It is dehydrated by heating with acids, more particularly with tartaric acid, forming *Apo-aconitine* $C_{33}H_{41}NO_{11}$. On saponification with alkali it splits up into benzoic acid and the base *Aconine* $C_{26}H_{39}NO_{11}$. 423

One of the most important features of the chemistry of aconite is, that unless the amount of aconitine present in the root be relatively to the picraconitine very considerable, it is impossible to obtain the crystalline form of aconitine. Even when it is possible to produce the crystallization, a certain amount of aconitine is always held in solution through the agency of the amorphous base, much as alkaline salts prevent the complete crystallization of sugar. It is also important to add that, after repeated crystallization, aconitine always retains mechanically a certain amount of the amorphous base. This can be completely got rid of by transforming the aconitine into a salt and by regenerating the alkaloid from this salt after being thoroughly freed from the mother liquor. In this way chemically pure and crystalline aconitine may be obtained. The purity may be determined by the melting point being 183° to 184°C., or by allowing an acidulated and etheral solution, to which carbonate of soda has been added, to slowly evaporate. If the entire mass crystallizes, it is pure, but if the last drop dries into a varnish, picraconitine must have been present.

Dr. **Wright** concludes his most valuable report on the aconites by saying: "The questions now remaining to be solved are essentially of a pharmaceutical and manufacturing nature, and as such somewhat out of the province of the scientific chemical investigator; these questions being simply the determination of the circumstances (as to soil, climate, age of plants, &c.) which influence the relative proportions between the crystallizable aconitine and the non-crystalline bases naturally accompanying it; so that the plants most suitable for the extraction of the alkaloids may be known; and the elaboration of the best method of separating the

crystallizable from the amorphous substances on a large scale." (*Year-Book of Pharm., 1881, p. 27.*)

424 **Medicinal Preparations.**—It is not necessary to enter into the properties of the aconite of European commerce. It is too well known to require to be treated of here, and no definite information can be obtained regarding the **A. Napellus** of Indian origin. It is enough to have briefly indicated the modern advances which have been made, and alongside of these to show the part which India must play before its aconite can either attain a larger commercial position or take the place, in Indian medical practice, of the imported article. It is more than likely that a large proportion of the aconitine found in the so-called **A. ferox** of India may be due to the exports of that drug having consisted of the roots of at least four species—**A. ferox, A. Lycoctonum, A. Napellus, and A. palmatum**—indiscriminately mixed together.

425 § "I have found **Aconitum Napellus** an invaluable drug in the reduction of the temperature of sun-stroke and pneumonia. As an external application, I have found it to be a most useful anodyne in facial neuralgia." (*Surgeon J. Parker, Poona.*)

426 Aconitum palmatum, *Don.; Fl. Br. Ind., I., 28.*

Habitat.—A perennial herb, chiefly of the eastern temperate Himálaya, extending from Garhwál to Sikkim, the Mishmí Hills, and along the north-eastern lofty ranges forming the frontier of Assam, to Mánipur, and to the higher peaks of the Nagá Hills, extending into Northern Burma.

Botanic Diagnosis.—*Stem* leafy, erect, simple, 2-5 feet high, glabrous. *Leaves* reniform, deeply 5-lobed, 4-6 inches in diameter, sinus shallow; *segments* cuneate-ovate, deeply and sharply cut; *petioles* long. *Panicles* few-flowered. *Flowers* large, greenish blue, on long pedicels; *helmet* much vaulted, shortly beaked, rather higher than broad. *Follicles* 5, 1-1½ inches long, glabrous. *Seeds* with a plaited testa.

MEDICINE. Root. 427 **Medicine.**—No definite information can at present be given regarding the roots of this plant. It was found plentiful on the loftier peaks north of Mánipur, where its roots are said to be poisonous. Samples of the roots sent from the Aka country (on the frontier of Assam), as those said to afford the arrow poison used by these wild hill tribes, seemed to agree with roots from Mánipur; and from the imperfect descriptions which could be obtained from other sources, it is probable that they are the roots of **A. palmatum**. The Aka roots on being chemically analysed by **Dr. Warden** were found to be poisonous.

428 § "*Jadwár-khatái* is the name in Leh for the root of an aconite (probably **A. ferox**) that is imported from Nepal *viá* Lhassa. It is called in the Panjáb *Nirbisí*, by Bhoteas in Leh *Bongá*, and by the Yarkandis *Farfí*: it is poisonous. It is administered in cases of poisoning and in severe illness such as cholera, and is carried as a talisman about the person." (*Surgeon-Major J. E. T. Aitchison, Simla.*) It is probable that the above remark, written by **Dr. Aitchison** on the proof copy of this work under **A. palmatum**, has little reference to that species; but, like most other facts regarding Indian aconites, it is quite impossible to determine the species referred to. **Dr. Aitchison** may probably be correct in attributing it to **A. ferox**, but the Panjáb name *Nirbisí* (*Nir*, free from, and *bisí* poison) is somewhat at variance with its being poisonous.

"**Dr. Dymock** (*Mat. Med., West. Ind.*) suspects the *Bikhma, bishma,* HIND., *Wakhma,* BOMB., to be the root of **A. palmatum**, which would therefore be a non-poisonous species. The root is very bitter and contains a well-defined bitter alkaloid; it has no poisonous properties."

The Sweet-flag.

In Sikkim the natives consider the root of **A. Palmatum** as not poisonous. (*Surgeon-Major G. King, Calcutta.*)

ACORUS, *Linn.; Gen. Pl., III., 999.* 429

A genus of aquatic herbaceous perennials (belonging to the Natural Order AROIDEÆ), comprising a number of forms which may, with advantage, be reduced to two species. *Spike* not enclosed by a spathe—the spathe forming a leaf appearing to continue the growth of the axis like a long ordinary leaf, so that the spike seems to arise upon the side of a leaf and near the middle. *Flowers* all hermaphrodite, composed of six green perianth leaves; six stamens opposite the perianth segments; and a three-celled ovary with sessile stigma.

Acorus Calamus, *Linn.; Roxb., Fl. Ind., Ed. C.B.C., 296.* 430

THE SWEET-FLAG.

Vern.—*Bach, ghor* or *gor bach,* HIND.; *Bach,* BENG., ASS.; *Vekhand, gandhilovaj, godá vaj,* GUJ.; *Vekhand,* MAR.; *Vekhanda,* CUTCH; *Gand-ki-lakri, vach,* DUK.; *Vachá ugra gandhaha, shadgranthá,* SANS.; *Vaj,* ARAB.; *Agre-turki,* PERS.; *Bariboj, warch,* PB.; *Vahi,* KASH.; *Vashambu,* TAM.; *Vasa, wasa, vadaja,* TEL.; *Vashanpa,* MAL.; *Bajé,* KAN.; *Linhe,* BURM.

In connection with the Telugu name *Vasa,* it may be noted (on the authority of **Moodeen Sheriff**) that the word *Ati-vasa,* which means greater Vasa, is applied to the root of **Aconitum heterophyllum,** and that *Ati-visha,* or greater poison, is the name for **A. ferox.** These two names must not therefore be confounded with *Vasa,* **Acorus Calamus.**

Habitat.—A semi-aquatic perennial, with indefinitely branched rhizomes; a native of Europe (?) and North America. Cultivated in damp, marshy places in India and Burma, altitude 3,000 to 6,000 feet; exceedingly common in Mánipur and the Nagá hills, often a weed of cultivation spreading apparently from the walls dividing the fields. Originally a native of Asia and probably introduced into Europe. Some difference of opinion prevails as to whether this is the **Calamus Aromaticus** of the Greeks which **Royle** regards as an Andropogon, but it seems probable that this was the plant.

Botanic Diagnosis.—*Rhizome* indefinitely branched, creeping in mud, with stout joints and large-leaf scars, cylindrical or somewhat compressed, about ¾ inch in diameter, smooth, pinkish or pale green, the leaf-scars brown, white and spongy within. Gives off below numerous straight rootlets. *Leaves* few, distichously alternate, forming erect tufts at the extremities of the rhizome, tapering into long acute points, entire, smooth; scapes arising from the outer leaves. All parts, but especially the rhizome, aromatic.

Properties and Uses—

Oil and Perfumery.—An essential oil is obtained from the leaves, which is used in England by perfumers in the manufacture of hair-powder. From the rhizome a pale or dark-yellow oil, with the strong penetrating odour of the root, and an aromatic, bitter, burning, camphoraceous flavour (due to the presence of a glucoside known as *Acorin*) is obtained by distillation. OIL. 431 Perfumery. 432

The *volatile* oil and *acorin* may be said to be the two substances to which Sweet-flag owes its properties.

Medicine.—The aromatic rhizome or root-stock is considered emetic in large doses, and stomachic and carminative in smaller doses. (*U. C. Dutt, Civil Medical Officer, Serampore.*) It is a simple useful remedy for flatulence, colic, or dyspepsia, and a pleasant adjunct to tonic or purgative medicines. It is also used in remittent fevers and ague by the native doctors, and is held in high esteem as an insectifuge, especially for fleas. In **Voigt's** *Hortus Suburbanus Calcuttensis* occurs the MEDICINE. Root-stock. 433

ACORUS Calamus.

Opinions regarding the Sweet-flag.

MEDICINE.

following (taken from *Thomson's Mat. Med.*): "The root has been employed in medicine since the time of Hippocrates. By the moderns it is successfully used in intermittent fevers, even after bark has failed and it is certainly a very useful addition to cinchona. It is also a useful adjunct to bitter and stomachic infusions." In European practice this medicine is not much if at all used. The rhizome is sold to a small extent by chemists in England, and in Scotland it is regarded useful to clear the throat before taking part in any public performance; for this purpose a small piece is chewed for a few minutes. It holds, however, an important position amongst the drugs regularly prescribed by Indian doctors. The Sweet-flag is the only plant which can be said to be taken by the Nagás as medicine, and it is also much valued by the Manipuris, especially in the treatment of coughs or sore-throat.

434 **Opinions of Medical Officers.**—§ "In Meerut the rhizome, with *bhang* and *ajowain* in equal parts, is powdered and used as a fumigation in painful piles." (*Surgeon-Major W. Moir* and *Assistant Surgeon T. N. Ghose, Meerut.*) "I found the root extremely useful in the dysentery of children, and also in bronchitic affections—*vide Ind. Med. Gazette* for February 1875, page 39, for further particulars." (*Surgeon B. Evers, M.D., Wardha.*)

"Aromatic, bitter, stimulant; useful as an expectorant in bronchitis.

"As a stomachic in flatulency in the form of infusion.

Bruised root	1 oz.
Boiling water	14 ,,

"Dose: 1 ounce and a half thrice daily." (*Surgeon C. M. Russell Sarun.*)

"The root, rubbed up with water or spirit, is used as a counter-irritant to the chest in the catarrh of children. It is generally supposed that the smell is disliked by the cobra, on which it produces a narcotic effect. For this reason it is cultivated near dwellings and chewed by snake-catchers." (*Surgeon H. McCalman, M.D., Ratnagiri, Bombay.*) "*Bach* is commonly used to allay distressing cough. I use it much for this purpose, with excellent results. A small piece of the dried root-stock kept in the mouth acts better than many cough lozenges. It produces a warm sensation in the mouth and a beneficial flow of saliva." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) "Used as a tonic and stomachic. Combined with chiretta, is used by natives for intermittent fever, also in dysentery (especially of native children)." (*Surgeon H. W. Hill, Mánbhúm.*) "In finely-powdered 10-grain doses taken internally with warm milk, allays the tingling sensation of the throat in catarrhal sore-throat." (*Assistant Surgeon Devendro Nath Roy, Calcutta.*) "I have myself used it in coughs and sore-throats with some success. It seems to stimulate the mucous membrane and the salivary glands, the result being an increased secretion and relief of dryness of throat and harassing dry cough. I used to chew a small piece now and again." (*Surgeon D. Basu, Faridpur.*) "Useful in dysentery; a decoction is made from the bruised root. Dose one ounce and a half." (*Dr. W. Forsyth, Civil Medical Officer, Dinajpore.*) "Is a tonic and stomachic, useful in cases of dyspepsia, loss of appetite, and debility." (*Brigade Surgeon J. H. Thornton, Monghyr.*)

435 "The rhizome is emetic, nauseant, antispasmodic, carminative, stomachic, stimulant, and insecticide. As an emetic it is more nauseant and depressent than Ipecacuanha, and it is therefore useful in most of the diseases in which the latter is indicated, including dysentery. It is one of the two vegetable drugs in this country which act efficiently as emetics in so small a dose as 30 grains. It should not be used in more than 35 grains, and in 40 grains its action is very violent and obstinate. It

Opinions regarding the Sweet-flag.

ACORUS Calamus.

MEDICINE.

is a good remedy in asthma, to relieve which, it should be first used in pretty large or nauseant doses (15 to 20 grains) and then repeated every 2 or 3 hours in smaller or expectorant doses (10 grains) till relieved. Among other diseases which are most benefited by this drug are bronchial catarrh, hysteria, neuralgia, and some forms of dyspepsia. The rhizome can also be used in the form of a tincture or an infusion." *(Hony. Surgeon Moodeen Sheriff, Khan Bahadur, Madras.)*

"It is used in Madras as a flea-powder and is very effective." *(Deputy Surgeon-General G. Bidie, C.I.E., Madras.)* "A time-honoured domestic remedy for cough and fever, especially in children, even of the tenderest age, given, grated into a paste, with the milk of the mother. Is administered in the same form in colic of children. Has been used here in the form of infusion (1 in 20) in bronchial catarrh and febricula. In the former disease its efficacy is increased in combination with infusion of liquorice root (1 in 20). It is also supposed to destroy fleas, for which purpose an infusion of the root is used." *(Surgeon-Major Lewis Charles Nanney, Trichinopoly.)* "Useful as an external application on the abdomen of children suffering from flatulent colic. The root is burnt to cinder, mixed either with cocoanut or castor oil and smeared over the abdomen." *(Hony. Surgeon Peter Anderson, Guntúr, Madras Presidency.)* "A carminative, tonic, and insectifuge. Root is slightly burnt and powdered, grains 2 to 10 for a dose. An infusion sprinkled in infected places drives away vermin." *(Surgeon-Major A. F. Dobson, Bangalore.)* "Used largely by the natives in the flatulent colic of infants. The rhizome is roasted over a light, and a small portion, rubbed down with human milk, is given internally, and also used as a paste over the umbilicus." *(Hony. Surgeon Easton Alfred Morris, Negapatam.)* "Antispasmodic and sedative to the nervous system, used for colic of young children both externally and internally." *(Surgeon-Major Henry David Cook, Calicut, Malabar.)* "The root-stock is burnt to charcoal, then pulverised: 10 to 20 grains of this powder mixed with water is given to counteract the effect of croton. Is considered as an antidote in cases of croton-poisoning." *(Surgeon W. A. Lee, Mangalore.)* "Rhizome powder, dose 20 to 40 grains; infusion (1 oz. to 10 oz. boiling water), dose 1 to 2 oz. (*Pharm. Ind.*) Stomachic and carminative, insecticide." *(Apothecary Thomas Ward, Madanapalle, Cuddapah.)* "Is common in Southern India; it is antispasmodic and carminative, often used for children, also applied externally on the abdomen to expel flatus. It is used to keep moths from woollen goods and fleas from rooms, &c." *(Surgeon Mark Robinson, Coorg.)* "Used internally in the shape of decoction for children, as a carminative, dose grains v.; also externally in the form of paste applied to the abdomen in tympanitis." *(Surgeon-Major J. J. L. Ratton, M.D., Salem.)* "Is given internally by first burning the end of the root and rubbing it down in milk (as a vehicle) for flatulence, &c. It is also applied externally over the abdomen for flatulence in infants." *(Surgeon-Major Lionel Beech, Cocanada.)* 436

"The burnt root acts as an astringent in infantile diarrhœa." *(Assistant Surgeon Ruthnam T. Moodelliar, Chingleput, Madras Presidency.)* "In 3-grain doses it is very effectual in relieving the colic of small children." *(Surgeon-Major John North, Bangalore.)* 437

"The rhizome is largely used in North Bengal in coughs and sore throats; a few thin slices are given to chew, having been slightly warmed before the fire; it is more efficacious than cough lozenges in relieving the irritation of the throat. It is also used as a carminative in dyspepsia. In Western India it is used externally as an application on bruises and rheumatism rubbed up with the spirits made from the Cashew-nut fruit." *(Surgeon-Major C. T. Peters, South Afghánistan.)*

"Stimulant 1 to 5 grs., emetic one to two scruples. It is used in cases of colic and dyspepsia; when applied externally in the form of a paste over the head it relieves headache; when rubbed over the nose, it arrests the progress of influenza and bronchial catarrh." *(Surgeon W. Barren, Bhuj, Cutch, Bombay.)* "A small piece kept in the mouth and its juice swallowed relieves cough and tickling of the throat; it produces salivation and an agreeable warmth." *(Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.)*

Chemical Composition.—§ "The dried rhizome yields, according to the editors of the *Pharmacographia*, 1·3 per cent. of a neutral yellowish essential oil, of an agreeable odour, which **Curratow** has shown contains Tærpene. **Faust** has isolated a bitter semi-fluid, nitrogenous glucoside, *acorin*, while **Fluckiger** and **Hanbury** have obtained a very bitter crystalline principle." (*Surgeon C. J. Hislop Warden, Prof. of Chemistry, Calcutta.*)

Spirit. 438 **Spirit.**—It is stated that a considerable amount of the rhizomes of this plant are used in flavouring gin, beer, &c. For this purpose the market is said to be chiefly supplied from the river-banks in Norfolk. Formerly the leaves of the Sweet-flag were spread over the floors of churches and cathedrals (especially in Norfolk) upon great occasions, the pressure of the foot causing a pleasant odour. The rhizome is said to be used in India in the preparation of an aromatic vinegar.

Vinegar. 439 **Trade.**—**Dr. Dymock** remarks that the drug imported into Bombay comes chiefly from the Persian Gulf; it brings about R3 a maund of 37½ seers. There is a very considerable trade in this article done in Calcutta.

ACROCARPUS, *W. & A.; Genl Pl.*

A genus containing only a single species (belonging to the sub-order MIMOSÆ, of the Natural Order LEGUMINOSÆ).

440 **Acrocarpus fraxinifolius,** *Wight; Fl. Br. Ind., II., 292; Wight, Ic., t. 254.*

RED OR PINK CEDAR (of tea-planters).

Vern.—*Mandania,* NEPAL; *Mad ling,* LEPCHA; *Malai-kone,* TINNEVELLY; *Kalinji,* NILGHIRIS; *Kilingi,* BURGHERS; *Hantige, belanjihavulige,* KAN.

Habitat.—A lofty, deciduous tree, found in the Eastern Himálaya and lower hills down to Chittagong, ascending to 4,000 feet; also in South India and Burma.

TIMBER. 441 **Structure of the Wood.**—Sapwood white; heartwood light red, moderately hard. Weight 39 lbs. per cubic foot.

DOMESTIC USES. 442 Used by planters in Darjiling for tea-boxes and planking, in the Wynaad for building and furniture, and in Coorg for shingles.

In the *Tropical Agriculturist* for May 1883, some interesting information is given regarding wood for tea-boxes. **Mr. Bruce** writes: "I have used this timber more perhaps than any other for tea-boxes and tea-house furniture in general, and if it has been well seasoned it is as good a wood as could be procured for the purpose."

ACROSTICHUM, *L.; Syn. Fil., 399.*

443 **Acrostichum (Stenochlœna) scandens,** *Willd.;* FILICES.

A common fern in the warmer parts of Ceylon.

Fibre.—Dr. Trimen informs me that ropes are made in Ceylon from this plant.

ACTÆA, *Linn.; Gen. Pl., I., 9.* 444

A genus of herbaceous perennials (belonging to the Natural Order RANUNCULACEÆ), comprising only two species, inhabiting the cold temperate regions of Europe, North Asia, and North America.

Leaves alternate, ternately compound. *Flowers* small, regular, in short crowded racemes. *Sepals* 3-5, unequal, petaloid. *Petals* 4-10, small, spathulate or wanting. *Stamens* many, slender. *Carpel* 1, many-ovuled; *stigma* sessile, dilated. *Fruit* a many-seeded berry.

(Compare with the allied genus CIMICIFUGA, which will be found to differ chiefly in the longer racemes (3-8 inch), and dry, dehiscent capsule, instead of a succulent berry.)

Actæa spicata, *Linn.; Fl. Br. Ind., I., 29.* 445

THE BANEBERRY.

References.—*U. S. Dispens., 15th Ed., 1560.*

Habitat.—Temperate Himálaya, from Bhután to Hazára. *Dist.*—Europe, North Asia, North America.

Botanic Diagnosis.—*Leaflets* ½-2 inches, ovate-lanceolate, entire or 3-lobed, acutely serrate. *Flowers* ¼ inch diameter, white. *Berry* black in the European and Himálayan form; white and red in the American. The two American forms are in popular scientific works treated as distinct species—**A. alba** and **A. rubra.** The berries are very poisonous.

Properties and Uses—

Medicine.—The drug which in Europe and America is prescribed under the name of Tinctura Actæa racemosæ is prepared from **Cimicifuga racemosa** and not from a species of **Actæa.** **Stewart** remarks regarding **Actæa spicata**: "I have found no trace of its being used or dreaded" by the hill people on the Panjáb Himálaya. It would be interesting to know whether this be correct; for it is curious that so useful a plant should have escaped the notice of the natives of India. Canadian doctors administer the root in snake-bite; and it is said to be attended with much success in the treatment of nervous diseases, rheumatic fever, chorea, and lumbago. **Mr. Frederick Stearns** describes the root as violently purgative. The berries were formerly used internally for asthma and scrofula, and externally for skin complaints. Baneberry Root is largely exported into Europe and used to adulterate the root of **Helleborus niger,** but the former may readily be distinguished on section by the presence of radiating medullary bands, while **Hellebore** has an entire or undivided substance. An infusion of **Actæa** root is changed into black on adding a solution of persulphate of iron acting upon the tannic acid of the **Actæa.** No such change is effected upon an infusion of **Hellebore.**

MEDICINE. The Root. 446

§ "**Actæa racemosa.**—A tincture of the root is a powerful nerve sedative, and will often relieve severe neuralgia when all other drugs fail." (*Dr. S. Westcott.*) "It would be worth while to try this drug as a substitute for **Actæa racemosa,** which I find very serviceable in chronic rheumatism and uterine disorders." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) It seems probable that by **Actæa racemosa** is meant **Cimicifuga racemosa,** and in that case the above medical opinions should be transferred to the latter species. See **Cimicifuga** and **Helleborus.**

ACTINIOPTERIS, *Link.; Syn. Fil., 246.* 447

A genus of ferns (FILICES) belonging to the tribe ASPLENIEÆ. *Sori* linear, elongated, submarginal; *indusium* the same shape as the sorus and folded over it; placed one on each side of the narrow segments of the frond and opening towards the midrib.

448 **Actiniopteris dichotoma,** *Bedd.; Clarke's Ferns, N. Ind., in Trans. Lin. Soc., 1880.*

Syn.—A. RADIATA, *Link.*; ACROSTICHUM DICHOTOMUM, *Forsk.*
Vern.—*Mor-pankhi, mor-pach,* N.-W. P.; *Mápursika,* BOMB.

Habitat.—Common throughout India on the lower hills of the peninsula. Very characteristic of the Nilgiris up to altitude 2,000 feet, and of Kumaon and West Nepal; rare in the plains of India, occurring, as at Agra, Delhi, and Moradabad, in crevices of rocks and in old masonry.

Botanic Diagnosis.—An exceedingly pretty fern, like a miniature palm. *Fronds* fan-shaped, 1 to 1½ inches in breadth, composed of numerous dichotomous segments.

MEDICINE. 449 **Medicine.**—Used as an anthelmintic (*Atkinson*).

§ "Very common on old walls in the Deccan; used as a styptic." (*Surgeon-Major W. Dymock, Bombay.*)

450 **ACTINODAPHNE,** *Nees; Gen. Pl., III., 160.*

A genus of trees or bushes (belonging to the Natural Order LAURINEÆ) comprising 50 species, of which 9 or 10 are Indian, inhabiting the warm, moist forests of the lower hills.

Leaves sub-opposite or clustered at the ramifications and tips of the branches, thick coriaceous, pennivened. *Flowers* diœcious, sessile clustered in sessile fascicles, in bud enclosed by imbricate caducous scales. *Perianth* with a short tube broken into 6 sub-equal leaves. *Male flowers* with 9 perfect stamens arranged in three rows of three each, the innermost having a gland on either side of the filament; *anthers* all introrse, 4-loculate. *Ovary* immersed in the cup-shaped tube of the calyx; *style* tapering; *stigma* dilated. *Fruit* a berry placed in the disk or cup of the perianth.

Very little of importance can be said regarding the Indian species of this genus. The following are those best known :—

451 **Actinodaphne angustifolia,** *Nees; Wight's Ic., t. 1841.*

Syn.—LITSÆA ANGUSTIFOLIA, *Bl.*
Vern.—*Samkoh,* ASS.; *Boltanaro,* GÁRO; *Tabongdeing,* MAGH.; *Shwoaygjo, nalingjo,* BURM.

Habitat.—An evergreen tree, with the leaves rusty-tomentose beneath; met with in Eastern Bengal, South India, and Burma.

452 **A. Hookeri,** *Meissn.*

Syn.—A. LANCEOLATA, *Dals.*
Vern.—*Pisa,* BOMB.

Habitat.—A small tree or shrub of Sikkim, and of the Eastern and Western Ghâts of South India and in Kanára and Sattára, and particularly at Mahableshwar.

Medicine.—"A cold infusion of the leaves is mucilaginous, and is used in urinary disorders and in diabetes. The oil of the seeds, *Pisa-tila,* is used as an external application to sprains; it is of a reddish colour and has a fatty odour." (*Surgeon-Major Dymock, Mat. Med., 554.*)

453 **A. obovata,** *Hook. f.*

Vern.—*Muslindi,* NEP.; *Pohor,* LEPCHA; *Laiphauseh,* MECHI; *Cherr tinga,* ASS.

Habitat.—A tall tree (with large 3-nerved leaves) occurring in the outer Sikkim Himálaya, Assam, Khásia Hills, and Sylhet.

Adamia versicolor, *Fortune;* **A. cyanea,** *Wall.,* and **A. chinensis,** *Gard.*
Synonyms for **Dichroa febrifuga,** *Lour.,* which see.

Adam's Apple—A name sometimes applied to the Lime or Lemon.

Adam's Needle, see **Yucca gloriosa**.

ADANSONIA, *Linn.; Gen. Pl., I., 209.* 454

A genus (belonging to the Natural Order MALVACEÆ and the Tribe BOMBACEÆ), containing in all only two species, one met with in tropical Africa, the other in Australia; the former is cultivated in India. *Leaves* digitate. *Calyx* 5-cleft, leathery. *Petals* 5, exceeding the sepals, adnate below to the stamens. *Style* divided into 5-10 branches; *stigmas* radiating. *Fruit* oblong, woody, indehiscent.

A genus named after **Adanson**, a celebrated French traveller, who lived in Senegal from 1749 to 1754.

Adansonia digitata, *Linn.; Fl. Br. Ind., I., 348.* 455

THE BAOBAB TREE; the SOUR GOURD, or the MONKEY BREAD TREE OF AFRICA.

Vern.—*Gorakhchincha* or *gorakh chints, choyari chinch* (The horse's tamarind, *gorakha-amli*), BOMB.; *Gor-amli chora, gorak-amali,* or *gorakh-amli,* HIND.; *Gorakha-amli, bukha,* GUJ.: *Gorakh chinch,* CUTCH; *Kalpbriskh,* or *kalbriskh,* AJMERE, DELHI; *Háthi khatyán* (the plant), DUK.; *Vilayti-imli,* MORAR; *Anai-puli, paparapuli* (the plant, *ánai-puliya-marram*), TAM.; *Hujed,* ARAB.

Dr. Dymock says the Bombay name *Gorakh* is derived from the name of a celebrated Hindú ascetic, who probably taught his disciples under this tree. Gorgkh and his disciple Machindar were well-known *Sadhus.*

Habitat.—This is one of the largest and longest-lived trees in the world. Trunk short, thick, often found 30 feet in diameter; branches spreading.

Cultivated, to a small extent, in some parts of India, but deserves to be extended; originally introduced by Arab traders, who call it *Habhabú.* It is chiefly met with in Bombay, being plentiful on the coast. "Four or five venerable specimens are in the Futtehpore district." The abandoned capital, Mandoo, near Indore, is overrun with Adansonias as other ruins are with the *pípul.*" (*R. T. H., Morar.*) "Pretty common about Madras; at one time it was proposed to cultivate it on account of the fibrous material in its bark." (*Deputy Surgeon-General G. Bidie, Madras.*) "Specimens are to be seen at Lucknow and at Allahabad." (*Brigade Surgeon G. A. Watson, Allahabad.*) It is also being experimentally cultivated in the Sunderbuns. There is a good specimen in the Barrackpore Park, and a small one on the Calcutta Maidan, a little beyond the Cathedral. In Africa it is said to extend through the continent from Senegal to Abyssinia. It has also been introduced into the West Indies. **Humboldt** speaks of this tree as "the tree of a thousand years," "the oldest organic monument of our planet." **Adanson** made a calculation to show that a tree 30 feet in diameter was over 5,000 years of age. He saw two trees 5 to 6 feet in diameter, on the bark of which were cut European names, one dated in the 14th and another in the 15th century. **Livingstone** says: "I would back a true *Mowana* (the name given to this tree in the neighbourhood of Lake Ngami) against a dozen floods, provided you do not boil it in salt water, but I cannot believe that any of those now alive had a chance of being subjected to the experiment of even the Noachian deluge."

Properties and Uses—

Gum.—§ "The bark when wounded yields a large quantity of white semi-fluid gum, which is odourless and tasteless, and has an acid reaction. GUM. 456

ADANSONIA digitata.

The Baobab.

Under the microscope, in addition to amorphous matter, a considerable number of minute bodies, with sharp projecting rays, are visible. The ash contains a large quantity of lime. Gum Baobab is insoluble in water, and appears to be allied to gum tragacanth." (*Surgeon C. J. H. Warden, Prof. of Chemistry, Calcutta.*)

FIBRE. 457 **Fibre.**—The bark yields a strong, useful fibre.

In Senegal it is made into ropes and woven into cloth. The hard outer bark is first chopped away, and the inner bark stripped off in large sheets. These are beaten with sticks to remove the pithy matter. The fibre is then sun-dried and pressed into bales. Small trees yield finer and softer fibre than large ones. The Africans use the fibre for making rope, twine, and sacking; in India, elephant saddles are made from it. The fibre imported into England from Portuguese West Africa readily sold at £9 to £15 a ton. It produces an exceedingly strong paper, suitable for bank-notes, and has received much attention. The slow growth of the tree, and the careful cultivation and shading it requires while young, renders it, however, a precarious source of paper fibre. (*Spons' Encycl.*)

Chemical Composition.—§ "From the bark **Walz** extracted a non-nitrogenous principle, which crystallizes in needles and prisms, and which he named *Adansonia.* The root contains a red colouring matter, soluble in water and in absolute alcohol. From its aqueous solution it is deposited as a red powder." (*Surgeon C. J. H. Warden, Prof. of Chemistry, Calcutta.*)

MEDICINE. Pulp. 458 Leaves. 459 Bark. 460 **Medicine.**—The FRUIT has a mucilaginous PULP, having a pleasant, cool, subacid taste, like cream of tartar; "a good refrigerant in fever." (*Bomb. Gaz., VI., 14.*) Used in Africa in dysentery. LEAVES dried and powdered constitute the "Lalo" of Africans, used to check excessive perspiration. The BARK is antiperiodic. "A useful substitute for quinine in low fever." (*Bom. Gaz., VI., 14.*)

MEDICINE. Wood. 461 Seed. 462 The pulp is used in Bombay with butter-milk in diarrhœa and dysentery. "The WOOD is said to possess antiseptic properties." (*Bom. Gaz., XIII., Part I., 24.*) The SEEDS are said to possess febrifugal properties.

In a recent correspondence with the Government of India regarding the desirability of producing a revised edition of the *Indian Pharmacopœia*, it was proposed this plant should be excluded from the new edition. The *U. S. Dispensatory, Ed. 15th*, says of it, however, that "the leaves and the bark abound in mucilage." "**Dr. Duchassaing**, of Guadaloupe, West Indies, and **M. Pierre**, of France, commend the bark highly as an antiperiodic. It is said to be acceptable to the stomach, and to produce no other observable physiological effect than increase of appetite, increased perspiration, and perhaps diminished frequency of pulse. An ounce may be boiled in a pint and a half of water to a pint, and the whole taken in a day." (*U. S. Disp., Ed. 15th, 1561; Jour. de Pharm. 2e Ser. XIII., 412 and 421.*)

In the *Pharm. India* it is stated that, according to **Dr. R. F. Hutchinson**, its action is not due to any astringent property which it possesses, but to its virtues as a refrigerant and diuretic. **Dr. Gibson** thinks that the properties of this tree are well deserving of attention.

§ "The pulp is said to be a useful external application in skin diseases —no personal experience." (*Surgeon J. Parker, Poona.*) "Useful astringent in diarrahœa and dysentery, dose 1 to 20 grains." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "Decoction used in bilious headaches. (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*)

FOOD. The Fruit. 463 **Food.**—The fruit, which varies in size and shape, is frequently 12 inches long, or only as large as a lemon, and resembles a gourd; contains many brown seeds, is somewhat acid, and makes a cooling and refreshing drink

It is also eaten by the natives. **Major Pedley,** in his expedition in search of Mungo Park, lived almost exclusively on it for twelve days. In Gujarát the fishermen eat the leaves with their food, and consider them cooling. In Senegal the negroes use the bark and leaves powdered as a condiment. **Leaves. 464**

Structure of the Wood.—Light, soft, and porous, made into rafts to support fishermen in tanks. It is readily attacked by fungi. **TIMBER. 465**

Domestic Uses.—Owing to the softness of the wood the stems of the Baobab trees are often excavated into living houses. **Livingstone** describes one of these excavated trunks as sufficient to allow 30 men to lie down. The bodies of men denied the honour of a burial are often in Africa suspended within these houses and soon become perfectly dry and converted into mummies without the necessity of being embalmed. The ash of the fruit and bark boiled in oil is used as soap by the negroes. The dry fruits are used as floats by the Indian fishermen. **DOMESTIC USES. Living houses. 466 Soap. 467 Floats. 468 The Fruit. 469**

ADELIA.

Adelia castanicarpa, *Roxb.* Syn. for **Chætocarpus castaneæcarpus,** Euphorbiaceæ, which see.

A. cordifolia, *Roxb.* Syn. for **Macaranga cordifolia,** *Müll.-Arg.,* which see.

A. neriifolia, *Roxb.* Syn. for **Homonoya riparia,** *Lour.,* which see.

ADENANTHERA, *Linn.; Gen. Pl., I., 590.* 470

A genus of trees or shrubs, without prickles (belonging to the Natural Order Leguminosæ, sub-order Mimoseæ), comprising in all some 4 species, spread throughout the tropics of the Old World, 2 being natives of India.

Leaves bipinnate. *Flowers* in spikes, minute, white, hermaphrodite. *Calyx* campanulate, equally toothed. *Petals* valvate, cohering only at the very base. *Stamens* 10, all free, equalling the corolla. *Seeds* scarlet.

The word Adenanthera is derived from the Gr. 'αδὴν, an acorn or gland, and ἀνθηρός, a flower.

Adenanthera aculeata, *Roxb.,* see **Prosopis spicigera,** *Linn.;* Leguminosæ.

A. pavonina, *Linn.; Fl. Br. Ind., II., 287; Wight, Ill., t. 84 (80).* 471

Red Wood (sometimes called Red Sandal Wood).

Vern.—*Rakta kanchan, rakta-kambal, ranjana* (sometimes also called *Rakta-chandan,* a name more correctly applied to **Pterocarpus santalinus**), Beng.; *Chandan, Ass.; Bir-mungara,* Santal; *Anai-gundumani,* Tam.; *Bandi gurivenda, pedda-guriginga,* Tel.; *Manjati,* Mal.; *Vál, thorligunj,* Mar.; *Bari-gumchi, hatti-gumchi,* Duk., Guj.; *Manjadi,* Kan.; *Madateya,* Cingh.; *Gung,* Magh.; *Ywaygyee,* or *ywegyi,* Burm.; *Rechedá,* And.

Habitat.—A large, deciduous tree, met with in Bengal, South India, and Burma.

Botanic Diagnosis.—*Leaves* compound, with 8-12 pinnæ and 12-18 obtuse leaflets. *Racemes* short, peduncled, 2-6 inches long; *seeds* bright scarlet.

In Ceylon a nearly allied species occurs known as **A. bicolor,** with 6-8 pinnæ, and leaflets acute. *Seeds* half black, half red.

Properties and Uses—

Gum.—*Spons' Encyclopædia* mentions a gum obtained from this plant and known as *madatia.* **GUM. 472**

Dye.—The wood is sometimes used as a dye, but chiefly as a substitute for the true red sandal wood. **DYE. 473**

OIL. 474 **Oil.**—The seeds yield an oil.

MEDICINE. Seeds. 475 **Medicine.**—The powder made from the SEEDS is said to be a useful external application, hastening suppuration. § "A grateful application over boils, soothing the burning pain and hastening recovery. It is also used to cure prickly heat." (*R. N. Gupta.*) "The emulsion, made by rubbing the seeds on a stone with water, forms a cooling external application useful in headache and in the early stages of inflammation." (*Surgeon J. Anderson, Bijnor.*) "*Vála* powder mixed with honey is used in colic—no personal experience." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) "A decoction is used by *Kobirages* in rheumatic affections. The powdered seed rubbed with water is used to disperse boils." (*Surgeon J. Parker, Poona.*) "Hakims use the powder in gonorrhœa." (*Surgeon-Major W. Moir* and *Assistant Surgeon T. N. Ghose, Meerut.*)

Leaves. 476 A decoction is made from the LEAVES in South India, and given as a remedy for chronic rheumatism and gout. If used for any length of time it is said to be anaphrodisiac. It is regarded as useful in hœmorrhage from the bowels and hæmaturia.

§ "The decoction is very useful as an astringent and tonic in atonic diarrhœa and dysentery." (*Assistant Surgeon Bhagwan Das, Rawal Pindi.*)

Wood. 477 "The wood, powdered and mixed with water, is said to be useful when applied to the forehead in cases of headache from over-exertion or exposure." (*Surgeon-Major C. W. Calthrop, Morar.*) "The red wood rubbed on stone with a little water and applied to the body is a certain temporary cure for prickly heat." (*Surgeon-Major Henry David Cooke, Calicut, Malabar.*) "Used as an emetic, in 60-grain doses, in warm water." (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*) "It is used as an external application in orchitis." (*Surgeon-Major J. F. Fitzpatrick, M.D., Coimbatore.*)

FOOD. 478 **Food.**—The seeds are sometimes eaten as an article of food.

TIMBER. 479 **Structure of the Wood.**—Heartwood red, hard, close-grained, durable, and strong.

The timber is used in South India for house-building and cabinet-making purposes.

§ "This is sometimes confounded with the **Pterocarpus santalinus**; but the latter yields the red sandal-wood of commerce, which is largely exported from South India." (*Deputy Surgeon-General G. Bidie, Madras.*)

DOMESTIC USES. The seeds as weights. 480 As Necklaces. 481 Forming Cement. 482 Tilak Paste. 483 **Domestic Uses.**—The bright scarlet seeds are used as weights, each being about 4 grains; they are also strung and made into necklaces. Powdered and beaten up with borax, they give a good cement. The red paste (*tilak*) made by rubbing the wood upon a moist stone is used by the Brahmins to colour the forehead after bathing.

ADHATODA, *Nees; Gen. Pl., II., 1112.*

A genus of sub-herbaceous bushes (belonging to the Natural Order ACANTHACEÆ, and the tribe JUSTICIEÆ), comprising in all some six species, distributed through tropical India, south tropical Africa, and Brazil.

Leaves opposite, entire, arising from swollen nodes. *Flowers* purple or white, crowded into a bracteated spike, sub-sessile, each flower having three bracts, the outer largest and persistent. *Calyx* campanulate, 5-fid, lobes lanceolate. *Corolla-tube* short; limb 2-labiate, the posterior lip erect, the anterior broad recurved, 3-fid. *Stamens* 2, each with 2 large diverging anther-cells, one much higher than the other. *Ovules* 2 in each cell, *placenta* not rising elastically from the base of the capsule.

The word Adhatoda is derived from the Tamil name for the Indian species.

Adhatoda Vasica, *Nees ; Fl. Br. Ind., IV.* 484

Syn.—JUSTICIA ADHATODA, *Linn.*

Vern.—*Arúsá, arushá, adalsá, adulasá, adulaso, adársa,* HIND., BOMB.; *Bákas, vásaka,* BENG.; *Adulsa,* MAR.; *Aduso,* GUJ.; *Arátórá,* DUK.; *Bhekkar,* JHELUM; *Basúti,* BEÁS; *Bekkar,* SALT-RANGE; *Tora bajja,* TRANS-INDUS; *Bashangarús,* KUMAON; *Arus, vásaka, vajidantakaha atarusha,* SANS.; *Rús,* OUDH; *Basung,* URIYA; *Adhatodai,* TAM.; *Adasara,* or *addasaram,* TEL.; *Atalótakam,* MAL.; *Teeshæ,* NAGÁ; *Kath, alesi,* NEPÁL.

Bánsa, vásá, bahikat, (?) HIND., in *Baden Powell's Pb. Prod., I., 365 ;* he also gives the vernacular names *Behikar, bhekar, p. 565.*

Habitat.—A small, sub-herbaceous bush, often gregarious, found everywhere in Bengal and in the Sub-Himálayan tracts, ascending to 4,000 feet in altitude.

Properties and Uses—

Dye.—A yellow dye, obtained from the leaves by boiling, is used for dyeing coarse cloth. It gives a greenish-blue when combined with indigo. This property is not apparently known to the Nagás, who cultivate the plant to shade the approaches to their villages. I repeatedly asked if they prepared a dye from it, and was told that they did not, but that they used the stems for divining. DYE. 485

Medicine.—The LEAVES and the ROOT of this plant are considered a very efficacious remedy for all sorts of coughs, being administered along with ginger. "The medicine was considered so serviceable in phthisis that it was said no man suffering from this disease need despair as long as the *vásaka* plant exists." (*U. C. Dutt, Civil Medical Officer, Serampore.*) It is often administered along with honey, the fresh juice or a decoction with pepper being made into a cough mixture. **Dr. Irvine** gives the dose as ½ oz. to 1 oz. of the decoction, and states that the price of the drug in Patna was 1 anna per lb. in the year 1848. The *Pharm. India* states that strong testimony has been given in favour of the remedial properties of this plant drawn from personal experience, in the treatment of chronic bronchitis, asthma, &c., when not attended with febrile action. The FLOWERS and the FRUIT are bitter, aromatic, and antispasmodic. The FRESH FLOWERS are bound over the eyes in cases of ophthalmia. "The flowers, leaves, and root, but especially the flowers, are supposed to possess antispasmodic qualities." "They are bitterish and sub-aromatic, and are administered in infusion and electuary." (*Ainslie.*) "The leaves are used as a cattle medicine." (*Gamble.*) MEDICINE. Leaves. 486 Root. 487 Fruit. 488 Flowers. 489

Special Opinions.—§ "Leaves recently dried are also *smoked* in cases of asthma; they produce very beneficial effects. Hospital Assistant **Gopal Chunder Gangooly,** of the Noakhally Dispensary, who is subject to asthma, has used the leaves in this form and testifies to their property." (*Assistant Surgeon Anund Chunder Mukerji, Noakhally.*) "The leaves made into cigarettes are used in asthma; they act as an antispasmodic." (*Brigade Surgeon J. H. Thornton, Monghyr.*) "Decoction of fresh leaves was found to be very useful in bronchial catarrh." (*Surgeon C. J. W. Meadows, Burrisal.*) "The dried bark, when smoked, relieves asthmatic fits; strong decoction of it in subacute bronchitis did not produce, in my hand, much benefit as an expectorant." (*Assistant Surgeon Devendro Nath Roy, Calcutta.*) "There are two varieties, one with red and the other with white flowers. The first is medicinally much more important. An infusion is used in bronchitis and consumption. A fluid extract of the leaves and flowers would be a desirable preparation for trial." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) Leaves smoked. 490 Bark. 491

"Excellent expectorant, dose 1 to 20 grains in chronic bronchitis and asthma." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "A fomentation

MEDICINE. with a strong decoction of the leaves is considered efficacious in rheumatic pains, and in neuralgia. Also useful in reducing swellings." *(Hony. Surgeon P. Kinsley, Chicacole, Ganjam Dist., Madras Presidency.)* "This shrub is very common in Mysore, and the powdered root is used by native doctors in cases of malarial fever." *(Surgeon-Major John North, Bangalore.)* "The juice of the leaves has been used as an excellent expectorant when combined with some native medicines; also used by native doctors as a diuretic in dropsical affections attended with anæmia." *(Surgeon-Major J. F. Fitzpatrick, M.D., Coimbatore.)* "Decoction is used to quench thirst in fever." *(Surgeon-Major J. J. L. Ratton, M.D., Salem.)*

"The juice of the leaves is used for diarrhœa and dysentery. It is considered especially useful in hæmoptysis and bleeding in dysentery." *(Surgeon-Major J. Robb, Ahmedabad.)* "Is a useful refrigerant in fever, given as decoction." *(Surgeon-Major John Lancaster, Chittore.)*

FODDER. 492 **Fodder.**—Not browsed by any animals, except occasionally by goats.

TIMBER. 493 **Structure of the Wood.**—White, moderately hard.

The timber of the thicker stems is used for gunpowder-charcoal and as a fuel for brick-burning.

§ "Though only a shrub, it is valuable, as yielding a good charcoal for gunpowder. Specimens of the wood may be got an inch in diameter. It is quite the characteristic plant of the lower hills." *(Baden Powell, Pb. Prod., I., 565.)*

DOMESTIC USES. 494 **Domestic Uses.**—The stems are used in the Nagá Hills for divining and to foretell omens. The twig is held in the left hand and rapidly cut into thin slices, an incantation being repeated all the while; the prognostications are based upon the number of times the heart-shaped, dark, central wood turns towards or away from the operator. The idea of medicine seems scarcely to have occurred to the Nagá, and he does not appear to attribute to this plant any virtues other than those described.

"The *rús* is extensively employed in the construction of the fascine-like supports of mud wells. The smaller branches are exceedingly pliant and are worked round and round in a sort of neat triple plait. The leaf

Manure. 495 is held to possess high qualities as a manure, and is scattered over the fields just before the rainy season commences. It is then worked into the soil with the plough, and left to decay with the moisture and thus

Fuel. 496 form mould. As fuel it is almost exclusively used in the process of boiling down the cane-juice, and is collected into large heaps some days prior to the cutting down of the sugar-cane." *(Oudh Gaz., III., 72.)*

497

ADIANTUM, *Linn.; Syn. Fil., 113.*

A genus of Ferns belonging to the Tribe PTERIDEÆ, recognizable from all the other ferns (except some LINDSAYÆ) by the texture and one-sidedness of their segments; veins bifurcating but not anastomosing (except in the small section HEWARDIA). *Sori* marginal, varying in shape from globose to linear, sometimes confluent. *Indusium* of the same shape as the sorus, being a modification of the margin of the leaf thrown over the sorus; it is free from the frond except at the edge. *Capsules* attached to the under-surface of the indusium.

A large genus, having its head-quarters in tropical America, comprising some 80 species, 9 of which are met with in India.

498 **Adiantum Capillus-Veneris,** *Linn.; Syn. Fil., 123.*

THE MAIDEN-HAIR FERN.

Vern.—*Dúmtúli,* KASHMIR; *Kirwatsei (bisfáij),* TRANS-INDUS; *Parsha warsha* (a corruption of *para-siyávashán,* **Moodeen Sheriff**) SALT-RANGE **(Stewart)**; *Mubáraka,* KUMAON **(Atkinson)**; *Pursha, hansráj,*

mubáraka, HIND.; *Shir* or *shair-ul-jin*, ARAB. (*Murray's Drugs of Sind*); *Sir siá-peshàne*, PERS. (**Dr. Rice**, NEW YORK); *Hanspadi*, GUJ.

Habitat.—A graceful, delicate fern of damp places, in rocks, walls, or wells, found chiefly in the Western Himálaya, ascending to altitude 8,000 feet, but found also far to the east in the valley of Mánipur, extending to the mountains of the Burma-Mánipur frontier and to Chittagong. It is common in the Panjáb, descending even to the plains, where it is found in wells and damp places. "This plant is quite common in South India—see *Beddome's Ferns.*" (*Deputy Surgeon-General G. Bidie, C.I.E., Madras.*) **Mr. C. B. Clarke**, in his *Ferns of Northern India*, gives its distribution as "Malabaria, Bombay to Ceylon (rare); from Kábul to England and Morocco; in tropical and temperate Africa and America; Queensland."

Botanic Diagnosis.—*Frond* usually 2-pinnate; segments ⅓-1 inch broad, the base cuneate, the outer edge rounded, deeply lobed from the circumference towards the centre, the lobes often again bluntly crenate; *petiole* near the centre. *Sori* roundish or obreniform.

Properties and Uses—

Smith's Economic Dictionary (1882) states that this is the plant used in the preparation of the so-called *Sirop de Capillaire* of Europe. This syrup is largely used in Italy and Greece in the treatment of chest complaints. **A. pedatum,** *Linn.*, is also extensively used for this purpose, being exported from Canada. **Dr. Dymock** draws my attention to the fact that **A. pedatum** is the French officinal plant, and that **A. Capillus-Veneris** is allowed as a substitute only. The former is a common North-West Himálayan plant. *Sirop de Capillaire* is imported into India, but might be prepared in the country to an unlimited extent, since at least four species of Adiantum are exceedingly common plants, especially **A. caudatum.** — Sirop de Capillaire. 499

Medicine.—It is more than likely that the bulk of Adiantum sold medicinally in India is the true maiden-hair fern, **A. Capillus-Veneris,** although most writers on Indian drugs attribute this to **A. venustum.** — MEDICINE. Fronds. 500

Dr. Irvine says: "*Hans Raj*, *shair-ul-jin*, Venus's hair, grows at Patna, but brought from Nepal; used as heating and febrifuge. Dose 20 to 30 grains, price 5 annas per lb." In the Panjáb the leaves, along with pepper, are administered as a febrifuge, and in South India, when prepared with honey, they are used in catarrhal affections.

It is probable, however, that the officinal root sold in the Panjáb bazars under the name of *Báisfaij* is a species of **Polypodium**, which see.

Adiantum caudatum, *Linn.*; *Syn. Fil.*, *115*. 501

Vern.—*Adhsarita-ka-jari, kanghai? gunkiri*, PB.; *Mayúrashikhá*, SANS.; *Mayurshika*, CUTCH; *Mylekondai?* TAM.

Habitat.—An exceedingly common plant in many parts of India, Bengal, N.-W. Provinces, the Panjáb, Madras, Bombay, &c., covering nearly every old wall in shady places, fronds rooting at the tip and thus forming new plants.

Botanic Diagnosis.—*Fronds* simply pinnate, tomentose, often elongated into a tail which generally roots at the tip. *Segments* (or pinnæ) ¼-⅜ inch long by ¼ inch broad, dimidiate, nearly sessile, the lower edge straight and horizontal, the upper rounded, more or less cut. *Sori* roundish.

Properties and Uses—

Ainslie says that in the Island of Bourbon the fronds of this species, as also of the preceding, are used in the preparation of *Sirop de Capillaire.* **Mr. Baden Powell** (*Pb. Prod., I., 384*) associates this with **A. venustum** and other species, and gives them the vernacular names *par-i-siyá-* — Fronds. 502

washán and *hansuráj*. He adds: "An astringent and aromatic; said to be emetic in large doses; also tonic and febrifuge. This is the fern which is used in making 'Capillaire' Syrup." It would be interesting to know if a syrup was actually prepared in the Panjáb from this plant, or if **Mr. Baden Powell** has simply associated the Panjáb plants with the European drug. (See **A. Capillus-Veneris** and **A. pedatum**, the plants used in Europe in the manufacture of the *Sirop de Capillaire*.)

MEDICINE. 503 **Medicine.**—§ "Used externally as a remedy for skin diseases." *(Surgeon W. Barren, Bhuj, Cutch, Bombay.)* "Said to be useful in diabetes." *(Surgeon-Major D. R. Thompson, M.D., C.I.E., Madras.)*

504 **Adiantum flabellulatum,** *Linn.; Syn. Fil., 126.*

Habitat.—Is very common in some parts of India. It was found plentiful in the oak and mixed forests of Mánipur.

Botanic Diagnosis.—Nearly allied to **A. pedatum,** smaller in size, but much thicker or coriaceous. *Scales* on the rhizome long, linear, chestnut-coloured; *rachis* often hairy, repeatedly dichotomous; *segments* glabrous, more or less rounded and toothed, the lower edge nearly straight; *sori* $\frac{1}{16}$ inch broad.

MEDICINE. 505 **Medicine.**—At Chuttuck I was told by a Mánipuri sepoy that the root was used medicinally.

506 **A. lunulatum,** *Burm.; Syn. Fil., 114; Hk., Ic. Pl., t. 191.*

Vern.—*Káli-jhánt,* BENG., HIND.; *Mubárak, rájahans* or *hansráj, kansaráj,* BOMB.; *Hansráj,* GUJ.; *Ghodkhúri,* MAR. (Horse's hoof, on account of the shape of the leaflets and the arrangement of the spores on under side like the horse-shoe.—*Surgeon-Major W. Dymock, Bombay.*)

Habitat.—This is unquestionably the commonest and most widely-spread Adiantum in India. In Bengal, every hedgerow and old brick-wall is covered with it, also the rocks and banks of the lower hills throughout the greater part of India; ascends to 4,000 feet; in damp glades it often becomes 2 feet in length, rooting as in **A. caudatum,** *Linn.*

Botanic Diagnosis.—*Frond* simply pinnate (in this respect allied to **A. caudatum**). *Rachis* naked, polished, dark brown. *Segments* glabrous, $\frac{3}{4}$ to $1\frac{1}{2}$ inch long by $\frac{1}{2}$ to 1 inch broad, subdimidiate, the lower edge nearly in a line with or oblique to the petiole, the upper edge rounded and usually more or less lobed.

Properties and Uses—

MEDICINE. Fronds. 507 While this and the preceding species are plentiful everywhere throughout Bengal, they do not seem to be collected for medicinal purposes, and it is probable that the fern root (*hansráj*) to be had in Calcutta native druggists' shops is imported and not procured locally. **Dr. Dymock** (*Mat. Med., W. Ind., p. 760*) seems to regard this as one of the species used medicinally in Bombay. (See under **A. venustum.**)

DYE. 508 **Dye.**—This and the preceding ferns, and probably also several other species, form ingredients in certain dye recipes.

Medicine.—§ "In Gujarát this is known as *Kálo-Hansráj.* It is extensively used in the treatment of children for febrile affections. The leaves are rubbed with water and given with sugar. It is worked up with ochre and applied locally for erysipelous affections. It is called *Kálo Hansráj,* probably on account of the black colour of the stalks." *(Surgeon-Major J. Robb, Ahmedabad.)*

"Demulcent, dose of the decoction one to two ounces. Used externally as a cooling lotion in cases of erysipelas." *(Surgeon W. Barren, Bhuj, Cutch, Bombay.)* "Very common in Madras, but not, so far as I know, used in native medicine." *(Deputy Surgeon-General G. Bidie, C.I.E., Madras.)*

Adiantum pedatum, *Linn.; Syn. Fil., 125.* 509

Habitat.—North-West Himálaya from Garhwál to Sikkim; nowhere very plentiful.

Botanic Diagnosis.—*Frond* herbaceous glaucose and glabrous, with shining naked rachis once dichotomous, main divisions flabellately branched and somewhat scorpioid on either side, central pinnæ 6-9 inches long and 1 to 1½ in. broad.

Properties and Uses—

This is the French officinal species used in the preparation of the *Sirop de Capillaire.* The *United States Dispensatory* says of it: "An indigenous fern, the leaves of which are bitterish and aromatic, and have been supposed to be useful in chronic catarrhs and other pectoral affections. A European species, known by the vulgar name, is the **A. Capillus-Veneris**, which has similar properties, though feebler."

A. venustum, *Don; Syn. Fil., 125.* 510

Vern.—*Par-e-siyá-washán, hansráj,* PERS., HIND. (in the BAZARS); *Shirul-jinn, shirul-jibal,* ARAB. The *Makhzan* gives *Káli-jhánp* or *Jhant* as the Hindi name of this plant. In Bombay it is chiefly known as *mubárak. Mayirsikki,* TAM.

Habitat.—A fern found in the Himálaya up to 8,000 feet in altitude, and, chiefly in the North-West, extending to Afghánistan; exceedingly plentiful in the fir forest north of Simla, often forming for miles the most characteristic under-vegetation. Sirop de Capillaire. 511

Botanic Diagnosis.—*Fronds* 3 to 4 times pinnate. *Rachis* slender, polished, naked; *segments* rigid, prominently veined and toothed, upper edge rounded, lower cuneate into the petiole; *sori* 1 to 3, large, roundish, placed in a distinct hollow on the upper edge.

Properties and Uses—

Medicine.—It possesses astringent and aromatic properties, is emetic in large doses; it is also tonic, febrifuge, and expectorant. This remark is given by **Mr. Baden Powell** in his *Panjáb Products* under **A. caudatum, A. venustum,** and other species, and it is probable that if all the preceding are not actually used indiscriminately, or as substitutes for each other, in different districts, they might easily be so, since they seem all to possess the same properties. **Stewart** says that "in Chumba it is pounded and applied to bruises, &c., and the plant appears to supply in the Panjáb most of the officinal *hansráj* which is administered as an anodyne in bronchitis, and is considered diuretic and emmenagogue." MEDICINE. Fronds. 512

Dr. Dymock describes the drug obtained from Adiantum under the joint names of A. **venustum,** *Don,* and **A. lunulatum,** *Spr.* The former plant is confined, however, to the North-West Himálaya, never descending below 3,000 feet in altitude, and is in fact much more temperate in its likings than any of the other supposed medicinal Adiantums. It has never been collected in Bombay, while the latter is plentiful, and, indeed, is one of the most abundant ferns in India, but is almost confined to the plains, or warm moist valleys of the lower hills. There can be no mistaking these two species,—the simply pinnate fronds of **A. lunulatum,** with segments (or pinnæ) sometimes as much as one inch in breadth, is quite unlike the tripinnate frond of **A. venustum,** with its rounded, deltoid, and cuneate-toothed and strongly-veined segments. There should be no difficulty in separating these two plants, but it would seem more than probable that they are never sold mixed together, although they may, in different parts of India, be substituted for each other. **A. Capillus-Veneris** is much more likely to be mixed with **A. venustum,** since it is very plentiful in most parts of India (as, for example, in the Panjáb plains, in wells) and very much

resembles **A. venustum.** Speaking of these two species collectively, **Dr. Dymock**, however, says: "The Native physicians consider the maiden-hair to be deobstruent and resolvent, useful for clearing the *primæ viæ* of bile, adust bile, and phlegm, also pectoral, expectorant, diuretic, and emmenagogue. Used as a plaster it is considered to be discutient, and is applied to chronic tumours of various kinds. The Persian name is *Parsiawashan*. In Arabic it has many names: the best known are *Shir-ul-jinn* and *Shir-ul-jibal* (fairy's hair or mountain hair)." (*Dymock's Mat. Med., W. Ind.*)

§ "This is imported into Bombay from Persia as *Parisiyahwashan*, but the people here often call it *Mubaraka* and *Hansráj*. Native writers on Materia Medica do not distinguish between the species of Adiantum. The *Makhzan* gives *Káló-jhánt* as the Hindi for *Parisiyahwashan*." (*Surgeon-Major W. Dymock, Bombay.*)

"It is recommended by Hakims for hydrophobia. It is resolvent, and is also used for the prevention of hair from falling. For internal use it is given in the form of a syrup." (*Assistant Surgeon J. N. Dey, Jeypore.*)

"A vapour bath medicated by a decoction from this plant is regarded useful in fever." (*Surgeon G. A. Emerson, Calcutta.*) "Very useful as a mild tonic, especially during convalescence from fever." (*Surgeon J. Anderson, Bijnor.*)

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ADINA, *Salisb.; Gen. Pl., II., 30.*

A genus of trees or shrubs (belonging to the Natural Order Rubiaceæ), comprising in all some six species, distributed through tropical Asia and America, four being met with in India. Adina is referred to the Tribe Naucleæ, having the flowers collected into dense globose heads. *Corolla* funnel-shaped; *stigma* simple. It is placed in the section of the Tribe said to have the ovaries free or nearly so.

The genus may be diagnosed thus: *Leaves* having large caducous stipules. *Flowers bracteate, densely crowded in solitary or panicled heads. Calyx-tube angled, 5-lobed. Corolla* funnel-shaped, with a long tube; throat glabrous, lobes 5-valvate. *Stamens* 5, on the mouth of the corolla; *filaments* short. *Ovary* 2-celled; *style* filiform; *stigma* capitate or clubbed; *ovules* numerous, imbricated upon a pendulous placenta in each cell. *Capsule* of 2 dehiscent cocci, many-seeded.

514 **Adina cordifolia,** *Hook. f. & Bth.; Fl. Br. Ind., III., 24; Cor., Pl. I., t. 53.*

Syn.—Nauclea cordifolia, *Roxb., Fl. Ind., Ed. C.B.C., 172.*

Vern.—*Haldu, hardu, kadámi, karam,* Hind.; *Bangka, keli-kadam, pet-puria, da-kóm,* Beng.; *Hardua, hardú (haldi in Gazetteer),* C. P.; *Kúrumba, komba sanko,* Kol; *Karám,* Santal; *Bara kuram,* Mal., (S. P.); *Karam,* Nepal; *Tikkoe,* Bahraich and Gonda; *Hardu, paspu, kurmi,* Gond; *Holonda,* Uriya; *Shangdong,* Garo; *Roghu, keli-kadam,* Ass.; *Manjakadambe,* Tam.; *Daduga, betta-ganapa, bandaru, dúdagú, paspu kandi, paspu kadimi,* Tel.; *Arsintega,* Mysore; *Hedde, yettéga-pettega, arsanatéga, yettada, ahuau,* Kan.; *Hedú,* Mar.; *Haladhwán,* Guj.; *Kolong,* Cingh.; *Thaing,* Magh; *Dhárákadamba,* Sans.; *Hnaw* or *hnaubeng, nhingpen* or *nhan-ben,* Burm.

Habitat.—A large, deciduous tree, found in the Sub-Himálayan tract from the Jumna eastward, ascending to 3,000 feet in altitude and extending throughout the moister regions of India, Burma, and Ceylon. It is common in the Western Peninsula, especially in the forests of the Ratnagiri and Thána Districts of the Konkan, and in the forests of Surat and of Baroda, in Gujarát; from thence it extends south into the forests of Mysore, is plentiful in the forests of the Upper Godaveri and of Bhandara in the Central Provinces. Is common in the mixed leaf-shedding forests all over Burmá from Chittagong and Ava to Pegu and Martabán.

Botanic Diagnosis.—*Leaves* with petiole 2 to 3 inches long, orbicular-

cordate, abruptly acuminate, pubescent beneath; *stipules* orbicular or oblong. *Peduncles* 1 to 3 axillary and one-headed. *Heads* of flowers ¾ to 1 inch diameter; *bracts* small towards the apex; *flowers* yellow.

Medicine.—§ "The small buds ground with round pepper are sniffed into the nose in severe headache." (*Rev. A. Campbell, Santal Mission, Pachumba.*) "Roots used as a medicine in Assam." (*H. Z. Darrah, Esq., Assam.*) MEDICINE. 515

Structure of the Wood.—Yellow, moderately hard, even-grained. No heartwood, no annual rings. It seasons well, takes a good polish, and is durable, but somewhat liable to warp and crack. Weight 40 to 50 lbs. TIMBER. 516

It is good for turning, and is extensively employed in construction, for furniture, agricultural implements, opium boxes, writing-tablets, gun-stocks, combs, and occasionally for dug-out canoes.

The *Bomb. Gaz., XIII., Part I., 24,* says: "this is a large, handsome tree; logs often more than 30 feet long; from durability in water they are much prized for fishing-stakes." In the *Mysore Gaz., I., p. 48,* occurs the following regarding this plant: "Wood like that of the box-tree; very close-grained, light and durable, but soon decays if exposed to wet."

Adina Griffithii, *Hook.f.; Fl. Br. Ind., III., 24.* 517

Habitat.—Khásia Mountains, altitude 3,000 feet.

Botanic Diagnosis.—*Leaves* shortly petioled, elliptic-oblong or obovate, shortly acuminate. *Heads* 1¼ inch diameter; *corolla* glabrous; *bracteoles* short, stiff, conical spines.

A. polycephala, *Benth.; Fl. Br. Ind., III., 25.* 518

Habitat.—Sylhet and the Khásia Hills, Chittagong, Tenasserim, and Moulmein.

Botanic Diagnosis.—*Leaves* shortly petioled, lanceolate, caudate-acuminate, glabrous. *Heads* in trichotomously-branched panicles.

A. sessilifolia, *Hook. f. & Bth.; Fl. Br. Ind., III., 24.* 519

Syn.—NAUCLEA SESSILIFOLIA, *Roxb.*; NAUCLEA SERICEA, *Wall.*

Vern.—*Kúm,* BENG.; *Kúmkoi,* CHAKMA; *Thaing,* MAGH; *Teinkala, thitpayoung,* BURM.

Habitat.—A small tree of Chittagong and Burma. In Chittagong it is perhaps the only gregarious tree, being commonly found on flat places on the banks of rivers.

Botanic Diagnosis.—*Leaves* sessile, oblong, base cordate, tip rounded, glabrous. *Heads* 1½ inches diameter, silky. *Corolla* shaggy.

Structure of the Wood.—Hard, yellow-brown. Weight 55 lbs. TIMBER. 520

Used in Chittagong for building purposes and firewood. Firewood 521

Adul Oil OF TRAVANCORE. OIL 522

Was forwarded to the Great Exhibition of 1851. The oil is medicinal, but the botanical name of the plant from which it is obtained has not as yet been discovered.

ADONIS, *Linn.; Gen. Pl., I., 5.* 523

A genus of herbaceous annuals or perennials, found chiefly as weeds of cultivation in the temperate regions; they belong to the Natural Order RANUNCULACEÆ. There are in all only some three or four species, of which three are met with on the western alpine Himálaya from Kumaon to Kashmír. None are found east of that region. They are botanically interesting as belonging to the tribe ANEMONEÆ, although they

possess a distinct calyx and corolla, the latter having 5 to 15 non-nectariferous petals. They are not known to be of any economic value, except that they are often met with in cultivation in Europe.

524 **ÆCHMANTHERA,** *Nees; Gen. Pl., II., 1088.*

A small genus of hairy shrubs (belonging to the Natural Order ACANTHACEÆ and the Tribe RUELLIEÆ), containing in all only two species, one met with on the Himálaya and the other in the Khásia Hills.

Leaves broad elliptic, acute, crenate, often viscid. Clusters of *flowers* sessile, scattered on the branches of the trichotomous cyme. *Corolla* tubula rventricose, nearly straight, widened suddenly near the middle, glabrous but with two hairy lines on the palate within; *segments* 5, sub-equal, rounded, twisted to the left in bud, pale violet or purplish. *Stamens* 4, didynamous, included longer filaments hairy; *anthers* two-celled, *cells* muticose; *connective* excurrent at the tip or not. *Ovary* densely hairy at the apex; *stigma* large, simple; *ovules* 4-6 in each cell. *Fruit* seeded to the bottom (a character which at once separates this genus from RUELLIA).

525 **Æchmanthera leiosperma,** *Clarke; Fl. Br. Ind., IV., 429.*

Habitat.—Jaintia and Khásia Hills, altitude 3,000 feet.

Mr. C. B. Clarke, in the *Flora of British India,* says of this curious plant that, except that the seeds are glabrous, and when wetted not discoid, the plant is hardly distinguishable from **Æ. tomentosa.**

No information regarding its economic uses.

526 **Æ. tomentosa,** *Nees, var.* **Wallichi**; *Fl. Br. Ind., IV., 428.*

Syn.—Æ. WALLICHI, *Nees;* Æ. GOSSYPINA, *Nees.*

Vern.—*Patrang, ban marú,* CHUMBA.

Habitat.—A small shrub, met with in the temperate Himálaya, from Kashmír to Bhután, altitude 3,000 to 5,000 feet.

Botanic Diagnosis.—*Leaves* hairy, elliptic, acute; *petiole* $1\frac{1}{2}$ inches long. *Anthers* oblong, connective, not excurrent. *Seeds* densely hairy, the hairs starting out when wetted.

FIBRE. 527 **Fibre.**—In **Dr. Stewart's** *Panjáb Plants* occurs the following note regarding this plant: "**Madden** states that bees are particularly fond of

Bees. 528 its flowers, and **Jameson** mentions that a kind of cloth is made from the tomentum of the leaf."

ÆGIALITIS, *R. Br.; Gen. Pl., II., 624.*

529 **Ægialitis annulata,** *R. Br.;* PLUMBAGINEÆ.

Syn.—Æ. ROTUNDIFOLIA, *Roxb., Fl. Ind., Ed. C.B.C., 278;* Æ. ANNULATA, *Kurz, in Journ., As. Soc.;* Æ. ROTUNDIFOLIA, *Prest. Bot. Bermeck.*

Habitat.—A small, evergreen treelet, with pale yellow, sessile flowers; found in the tidal forests of the Sunderbans, Chittagong, Arakan, Burma, and the Andaman Islands.

TIMBER 530 **Structure of the Wood.**—Very curious, resembling that of the monocotyledons. It consists of a soft pithy substance, with scattered white pore-bearing wood, resembling fibro-vascular bundles, but quite distinct in character.

ÆGICERAS, *Gærtn.; Gen. Pl., II., 648.*

531 **Ægiceras majus,** *Gærtn.; Fl. Br. Ind., III., 533; Wight, Ill., t. 146;* MYRSINEÆ.

Vern.—*Halsi, khalshi,* BENG.; *Bútayet,* BURM.; *Kánjlá,* MAR.; *Chawír,* SIND.

Habitat.—A small, evergreen tree, met with in the coast forests and

tidal creeks of the Western Coast, Bengal, Burma, and the Andaman Islands.

Structure of the Wood.—Hard, close-grained. No annual rings. Weight 40 lbs. TIMBER. 532

Used for firewood and in Jessore in the construction of native huts.

ÆGLE, *Corr.; Gen. Pl., I., 306.* 533

A genus (belonging to the Natural Order RUTACEÆ) comprising two or three trees inhabiting tropical Asia and Africa.

Leaves alternate, 3-foliolate; *leaflets* membranous, subcrenulate. *Flowers* large, white, in axillary panicles. *Stamens* 30 to 60, inserted round an inconspicuous disk; *filaments* short, subulate; *anthers* elongated, erect. *Ovary* ovoid from a broad axis; *cells* 8-20, peripheral; *ovules* many in each cell, 2-seriate. *Fruit* large, globose, 8-15-celled, 6- to many-seeded, rind woody. *Seeds* within membranous cells, buried in the aromatic pulp, oblong compressed; *testa* woolly and mucous; *cotyledons* thick, fleshy; *radicle* pointing away from the *hilum.*

The name Ægle is in allusion to one of the Hesperides, whose orchard bore golden fruit. Marmelos is the Portuguese for quince. By the mediæval writers this was called "Marmelos de Benguala," or Bengal Quince.

Ægle Marmelos, *Corr.; Fl. Br. Ind., I., 516; Wight, Ic., t. 16.* 534

THE BAEL OR BEL FRUIT TREE; THE BENGAL QUINCE.

Syn.—CRATÆVA MARMELOS, *Linn.*; C. RELIGIOSA, *Ainslie.*

Vern.—*Bél, sí-phal, siriphal,* HIND.; *Bela, bel, vilva,* BENG.; *Bel,* ASS.; *Bela, bila,* BOMB.; *Bel,* MAR.; *Bil,* GUJ.; *Bila, katori,* SIND.; *Sriphal, bilva, malura, bilvaphalam, balva,* SANS.; *Safarjale-hindi, shul,* ARAB., PERS.; *Lohagasi,* KOL.; *Auretpang,* MAGH.; *Vilva-pasham,* TAM.; *Marédu, maluramu, bilvapandu, patir,* TEL.; *Maika, mahaka,* GOND.; *Kúvalap-pasham,* MAL.; *Corvalum, bela,* KURKU; *Bilapatri,* or *Bel-patri,* KAN.; *Okshit, ushitben,* BURM.; *Bélli,* SINGH.

The *Bilva, mabura,* or *matura,* of the ancients. **Roxburgh** says a small variety is called *Shriphula* in Bengal.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 429; Pharm. Ind., 46; Flück. & Hanb., Pharmacog., 129; U. S. Dispens., Ed. 15th, 280; Bentl. & Trim., Med. Pl., 55; Dymock, Mat. Med. W. Ind., 112; Moodeen Sheriff, Supp. Pharm. Ind., 33; U. C. Dutt, Mat. Med. Hind., 129; Stewart's Pb. Pl., 28; Brandis, For. Fl., 57; Kurz, Burm. Fl., 199; Balfour's Cycl., I., 33; Official Correspondence, Home Dept.'s Progs., 1880, 286.*

Habitat.—A tree, found in cultivation all over India, often curiously sending up off-shoots from the roots, which in time become trees. Wild in Sub-Himálayan forests from the Jhelum eastward, in Central and South India, and in Burma.

Botanic Diagnosis.—A small, deciduous, glabrous tree, with straight, strong, axillary spines. *Leaves* pale green, of three leaflets; lateral *leaflets* sessile, ovate-lanceolate, 3-5 inches long, terminal long petioled. *Flowers* an inch in diameter, greenish white, sweetly scented.

This tree has its nearest affinity to the elephant-apple or wood-apple, but the imparipinnate leaves, 1-celled fruit, and few stamens of the latter, at once remove it from the *Bél.* The *Flora of British India* remarks that there is a form in Burma with oblong fruits, of which no definite information exists, and it is not known whether this is a distinct species or only a local variety. In most bazars of India there are two kinds—the small or wild form, and the large or cultivated. In a correspondence with the Home Department, Government of India, communicated by **Honorary Surgeon Moodeen Sheriff, Khan Bahadur,** and forwarded by the Government of Madras, these two forms are carefully compared and contrasted.

Dr. Moodeen Sheriff says the cultivated form is generally free from spines: "The leaflets are broadly and abruptly acuminate, instead of oblong or broadly lanceolate, and, when bruised, have an agreeable and aromatic odour; fruit three or four times larger, edible, and very delicious when quite ripe." The officinal part is the full-grown fruit of both varieties just when it begins to ripen. It is green or yellowish green externally and yellow internally. The mucus contained within the cells of the fruit and around the seeds is "thick, very tenacious, transparent, and terebinthinate in smell and taste." "The pulp should be removed from the rind before the fruit is dry, cut into small pieces, and dried in the sun. When dry the pulp of the small variety retains its yellowness, while that of the large becomes brown or reddish brown. The pulp of both has an agreeable and aromatic odour and a terebinthinate and bitterish taste. The pulp of the small or common variety, however, is much stronger in these respects and preferable as a medicine. The dried pulp is not destroyed by keeping."

THE GUM.

GUM from the Stem. 535 THE STEM yields a good gum, occurring in tears like gum arabic, or in fragmentary pieces resembling coarse brown sugar.

from the Seeds. 536 From THE SEEDS a mucous fluid is secreted within the cells of the fruit which hardens into a transparent, tasteless, gummy substance. **Roxburgh**, who rarely overlooked any facts connected with the plants he had the opportunity of examining, clearly described this substance, but by modern authors it has apparently been confused with the opaque yellowish pulp. **Roxburgh** says: "Berry large, sub-spherical, smooth, with a hard shell, from 10 to 15-celled; the cells contain, besides the seeds, a large quantity of an exceedingly tenacious, tran sparent gluten, which, on drying, becomes very hard, but continues transparent; when fresh it may be drawn out into threads of one or two yards in length, and so fine as to be scarcely perceptible to the naked eye, before it breaks." "The *mucus* of the seed is for some purposes a very good cement." (*Roxb., Fl. Ind., Ed. C.B.C., p. 429.*)

§ "The seeds and the mucus are encased in a rough, opaque membrane, in the form of a white bean—the carpels or cells of the fruit. From 10 to 15 of these bean-shaped cells, with the gluten and seeds inside, are found in each fruit. They are embedded vertically in the yellowish opaque pulp of the fruit. As stated by **Dr. Roxburgh**, the mucus is transparent and very tenacious. It has the appearance of an exceedingly pure white gum, and is almost tasteless. I am not aware of any use to which it is put, but with lime it acts as a very good cement for mending porcelain-ware." (*L. Liotard.*)

THE DYE.

DYE. Rind. 537 A yellow dye is obtained from the rind of the fruit; the unripe rind is also used along with myrabolans in calico-printing.

THE MEDICINAL PROPERTIES OF BĒL.

No drug has been longer and better known nor more appreciated by the inhabitants of India than *bél*; but the descriptions given by English writers are very ambiguous. The unripe fruit acts as an astringent; the ripe fruit, taken in the *fresh* state, is laxative, but the *dried* ripe pulp is only mildly astringent. By some authors the astringency is denied; a few chemists maintain that the fruit contains tannin, while others assert that this is not the case. The drug used in India, for diarrhœa and dysentery, is the roasted or sun-dried unripe fruit cut up into slices.

Synopsis of the parts of the plant as used medicinally.

MEDICINE.

(a) The UNRIPE FRUIT is cut up and sun-dried, and in this form is sold in the bazars in whole or broken slices. It is regarded as astringent, digestive, and stomachic, and is prescribed in diarrhœa and dysentery with debility of the mucous membrane, often proving effectual in chronic cases after all other medicines have failed. It seems specially useful in chronic diarrhœa; a simple change of the hours of meals and an alteration in the ordinary diet, combined with *bél* fruit, will almost universally succeed. **Unripe Fruit. 538**

(b) The RIPE FRUIT is sweet, aromatic, and cooling; made into a morning sherbet, cooled with ice, it is pleasantly laxative and a good simple cure for dyspepsia and is useful in febrile affections. The *dried* ripe pulp is mildly astringent and may be used in dysentery. A useful popular preparation, made in India, is the Bél-marmalade, which may be taken like jam at the breakfast table in convalescence from chronic dysentery or diarrhœa. **Ripe Fruit. 539**

(c) The ROOT (and sometimes the STEM) BARK is made into a decoction which is used in the treatment of intermittent fever. It constitutes an ingredient in the *dasamul* or ten roots. It is given in hypochondriasis and palpitation of the heart. **Root-bark. 540**

(d) The LEAVES are made into poultice, used in the treatment of ophthalmia. The fresh juice is bitter and pungent, and diluted with water is praised as a remedy in catarrhs and feverishness. **Leaves. 541**

(e) The ASTRINGENT RIND of the ripe fruit is employed in dyeing and tanning. It is also sometimes used medicinally. **Rind. 542**

§ "Sections of the dried rind are sometimes used as receptacles for medicines." (*Assistant Surgeon Bhagwan Das, Rawal Pindi.*)

(f) The FLOWERS are deemed fragrant by the Native physicians. **Flowers. 543**

The difference between the appearance and properties of fresh ripe fruit, and of the dried slices of unripe fruit sold in the druggists' shops and exported to Europe, must not be overlooked. The ripe pulp is of a pale orange or flesh colour, is deliciously fragrant, and yields with water a pleasant orange-coloured sherbet, slightly laxative. The dried slices give a reddish solution, acid and astringent in its action (or by some authors considered stimulant to the mucous membrane, but not astringent), and not possessed of the characteristic fragrance of the ripe fruit. The dried slices are prepared from the unripe fruit before the pulp has either become flesh-coloured or acquired its characteristic odour. **Dr. Moodeen Sheriff** (*in the official correspondence quoted*) says it is "a tonic, stomachic febrifuge, nauseant, and a remedy in dysentery, scurvy, and apthæ. It is not astringent, and therefore not useful in all forms of dysentery and diarrhœa. Acute dysentery is the disease which is most benefited by it, particularly in its first stage. It seems to exercise a greater influence in altering the nature of the motions than in diminishing their frequency. Its usefulness is greatly enhanced by the combination of opium. (Pulv. Ipecac. Co.)" (Compare with medical opinions.)

Chemical Composition.

According to **Dr. Macnamara** and **Mr. Pollock**, *bél* contains tannic acid, a concrete volatile oil, a bitter principle, and a balsamic principle resembling Balsam of Peru. Speaking of this analysis, **Professor Flückiger** and **D. Hanbury**, in their *Pharmacographia*, say they are unable to confirm the conclusions arrived at; "Nor can we explain by any chemical examination upon what constituent the alleged medicinal efficacy of bael depends." With reference to the unripe dried fruit these learned authors say: "The pulp, moistened with cold water, yields a red liquid

ÆGLE Marmelos.

Opinions of Medical Officers

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containing chiefly mucilage and (probably) pectin, which separates if the liquid is concentrated by evaporation. The mucilage may be precipitated by neutral acetate of lead or by alcohol, but is not coloured by iodine. It may be separated by a filter into a portion truly soluble (as proved by the addition of alcohol or acetate of lead), and another, comprehending the larger bulk, which is only swollen like tragacanth, but is far more glutinous and completely transparent.

"Neither a per- nor a proto-salt of iron shows the infusion to contain any appreciable quantity of tannin, nor is the drug in any sense possessed of astringent properties." (*Pharmacographia, Ed. 1879, 131.*)

§ "A section of both the ripe and unripe fruit, when moistened with a solution of ferric chloride, gives a most marked tannic acid reaction strongest in those portions of the pulp nearest to the rind. **Flückiger** and **Hanbury's** statement (quoted above) that the drug does not contain any appreciable amount of tannin, and is therefore not possessed of astringent properties, requires to be modified. The clear mucilage which surrounds the seeds has an acid reaction, and is readily soluble in water. It gives no reaction with either ferrous or ferric salts, and does not possess any astringent properties. It contains lime." (*Surgeon Warden, Prof. of Chemistry, Calcutta.*)

Officinal Preparations.

PREPARATIONS. Extract. 544

(1) Extract of Bél.—Made from the fresh unripe fruit. Dose from half a drachm to one drachm twice or thrice daily.

Liquid Extract. 545

(2) Liquid extract of Bél.—Prepared from the dried slices of unripe fruit. This possesses in a much less degree the properties of the extract. Dose one to two fluid drachms.
Made officinal in *Pharmacopœia of India* in 1868.

(3) **Dr. Moodeen Sheriff** says that a powder of the dried pulp is the most convenient form of administration: it keeps well in tight bottles. Dose as a tonic 12 to 15 grains; as a febrifuge and remedy for scurvy and apthæ, 16 to 20 grains; and as a nauseant and remedy in dysentery, 20 grains to 2 drachms.

Opinions regarding the Unripe Fruit.

§ "The pulp of the unripe fruit is soaked in gingelly oil for a week, and this oil smeared over the body before bathing, to remove the peculiar burning sensation in the soles of the feet so common amongst natives." (*Surgeon-Major John Lancaster, M.B., Chittore.*)

"I have found this fruit very useful in cattarrh and diarrhœa, but of very little use in acute dysentery. I consider the taste unpleasant." (*Surgeon-Major H. J. Haslitt, Ootacamund, Nilgiri Hills.*)

"The unripe fruit, in the form of decoction, is very effective in cases of chronic diarrhœa, such as occur in jails, where there is also probably a scorbutic element present. Its efficiency is increased by the addition of opium. I have not found it produce hæmorrhoids in any of my cases, although the drug has been continued for a long time." (*Surgeon S. H. Browne, M.D., Hoshangabad, Central Provinces.*)

"Pulp of green fruit, softened by roasting and sweetened with sugar-candy, is useful in chronic diarrhœa and dysentery. The 'sharbat' of ripe fruit is a pleasant, cooling drink, but heavy of digestion, often causing acidity and heartburn." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*)

"Very useful in chronic dysentery. In the acute form it is not so useful, owing to the rapidity with which inflammatory action proceeds and grave ulceration supervenes." (*Surgeon-Major C. R. G. Parker, Pallaveram, Madras.*) "Most useful in diarrhœa due to general relaxed state of health

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(more particularly in summer.)" (*Surgeon H. D. Masani, Karachi, Bombay.*) "Astringent in chronic dysentery and diarrhœa, the unripe fruit made into decoction. The ripe fruit is eaten with sugar." (*Surgeon-Major A. F. Dobson, M.B., Bangalore.*) "It is also pickled, and in this state is of great benefit in chronic dysentery." (*Surgeon-Major A. S. G. Jayakar, Muskat, Arabia.*) "I always use this in chronic diarrhœa, especially after an attack of dysentery." (*Surgeon-Major H. D. Cook, Calicut, Malabar.*) "If used for any length of time, *bél* is apt to produce hæmorrhoids, but this is avoided by using a little sugar along with the *bél*." (*Surgeon G. A. Emerson, Calcutta.*)

"The powder is more useful in acute diseases, and the syrup in chronic affections. In acute dysentery, the powder should be administered in much larger doses than in any other disease. Its first good effect is the rapid disappearance of blood and increase of the fœculent matter in the motions. It seems to have, in fact, more power to alter the nature of the motions than to reduce their number. For the latter purpose, *i.e.*, to check the frequency of the motions, it requires to be combined with some preparation of opium. The powder of bael fruit is also useful in relieving the febrile symptoms in all forms of idiopathic fevers, including hectic and typhoid. The abnormal temperature, in febrile conditions, is reduced under its use, in a very remarkable manner. Doses of the powder, as a remedy in dysentery, from 20 grains to 1 drachm, 4, 5, or 6 times in the 24 hours; and for all other purposes, from 10 to 20 grains. Of the syrup, from 2 to 4 or 6 fluid drachms 3 or 4 times in the 24 hours." (*Hony. Surgeon Moodeen Sheriff, Madras.*)

"Used as an astringent in diarrhœa and dysentery. The following powder is found very efficacious in chronic diarrhœa and dysentery:—

Bél pulp.
Bruised mango seeds.
Catechu.
Bruised seeds of Plantago Isphagula.
Almond.
Sugar."
(*Jaswant Rai, Mooltan.*)

"The ripe fruit, when fresh, is mucilaginous, astringent, and slightly acid; I have found it useful in diarrhœa. The powder or decoction of the dry fruit may be used in the place of fresh fruit." (*Assistant Surgeon Bhagwan Das, Rawal Pindi.*)

"The half-ripe fruit, freshly gathered, is very useful in cases of obstinate diarrhœa and dysentery, especially if scurvy be present. Made into a powder with arrowroot it is very useful in the bowel complaints of children." (*Brigade Surgeon J. H. Thornton, B.A., M.B., Monghyr.*) "A liquid extract is the best way of administering this drug; it is somewhat overrated. It is useful in dysentery with scorbutic taint." (*Surgeon G. Cumberland Ross, Delhi.*)

"I think the ripe pulp is of very little value as an astringent. The unripe fruit is decidedly astringent." (*Deputy Surgeon-General G. Bidie, C.I.E., Madras.*)

"I have used unripe *bél* fruit in two ways: (*a*) entire *bél* fruit, partially burnt, about half or one third of each fruit to a man once a day. The burning softens the pulp and makes it more digestible; (*b*) unripe *bél* cut into slices and sun-dried and boiled before eating with a little sugar. In both ways it has been found to be a *mild* astringent, stomachic, and nutritive, most useful in chronic dysentery and diarrhœa; slowly but steadily reducing the number of motions and the quantity of mucus. The ripe fruit made into a sherbet is a mild laxative and cooling drink; a little *dahi* or tamarind and sugar is added to give a subacid taste and to increase the cooling laxative property." (*Surgeon D. Basu, Faridpur.*) "Both the ripe and unripe fruits are useful in dysentery, especially after

The Bael Fruit.

MEDICINE.

the acute symptoms have been checked by ipecacuanha." (*Surgeon Price, Shahabad.*)

"I have used a strong decoction of the dried and sliced fruit in chronic dysentery and diarrhœa, also the sherbet and pulp of the ripe fruit and the different forms of *bél* powder and preserve." (*Surgeon Picachy, Purneah.*) "The unripe fruit is roasted in the fire, and the pulp eaten in chronic dysentery and diarrhœa." (*Surgeon Bensley, Rajshahye.*)

"Its astringent property is due to the presence of tannic acid." (*Surgeon C. M. Russell, Sarun.*) "Used in chronic gonorrhœa, when the pulp of a fresh fruit is mixed with milk and administered with cubeb powder. Supposed to act as a diuretic and astringent on the mucus membranes of the generative organs." (*Surgeon-Major J. T. Fitzpatrick, M.D., Coimbatore.*) "The unripe fruit is half roasted in hot ashes; the whole fruit, with the rind and all, is beaten into a pulp, mixed with a sufficient quantity of water, strained and taken in large draughts with a little *palmyra* sugarcandy in cases of chronic dysentery." (*Surgeon-Major D. R. Thompson, M.D., C.I.E., Madras.*)

"The unripe fruit, powdered and given in doses of gr. vi and kino Co. gr. i with sugar gr. ii in each powder, to a small child suffering from chronic diarrhœa, was most useful. Extract has been prepared from the same by powdering, mixing with water, and evaporating to prope strength." (*Surgeon G. F. Poynder, Roorkee.*)

"The unripe fruit is used as a pickle. It is also made into preserve and commonly used for cases of dysentery." (*Surgeon-Major Robb, Ahmedabad.*)

Regarding the Ripe Fruit and Sherbet.—"The use of ripe fruit, in the form of *sherbet*, is very valuable in seasons of prevalence of bowel complaints and cholera. The strained pulp of the half-roasted unripe fruit is more efficacious than the extracts sold by English druggists in diarrhœa and dysentery." (*Surgeon R. L. Dutt, M.D., Pubna.*) "Sherbet made from the ripe fruit is most useful in chronic dysentery and diarrhœa." (*Surgeon C. H. Joubert, Darjiling*).

"The ripe fruit is an excellent laxative. The sherbet should be made thick enough to be eaten with a spoon, and not, as many servants make it, so thin that it can be drunk. The quantity required to produce a laxative effect is a small tumblerful; a mixture of half milk and half sherbet is an agreeable drink." (*Surgeon Edw. Borill, Champarun.*)

"A very pleasant and extremely useful fruit. Thick sherbet made of the ripe fruit is the best and surest laxative I know; the quantity necessary to produce this effect being an ordinary tumblerful. Very useful in dyspepsia and habitual constipation." (*Surgeon G. Price, Shahabad.*) "The pulp of the fresh fruit in the form of a thick sherbet is much recommended in scurvy, acting at the same time as a purgative." (*G. W.*) "In subacute and chronic dysentery often invaluable, taken in the form of sherbet." (*Surgeon J. Maitland, M.B., Madras.*)

"Prescribed in diarrhœa and dysentery. I have used the liquid extract very successfully as an injection in cases of gonorrhœa. The ripe fruit is eaten with sugar by natives suffering from dysentery or diarrhœa." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*)

Regarding the Leaves.—"Leaves are very efficacious when pounded into a pulp without any admixture of water and applied cold in the form of a poultice to unhealthy ulcers." (*Assistant Surgeon Anund Chunder Mukerji, Noakhally.*) "The fresh juice of the leaves acts as a mild laxative in cases of fever and catarrh, and has probably the effect of remedying these conditions." (*Doyal Chunder Shome, Lecturer, Campbell Medical School, Sealdah.*) "The decoction of the leaves is used as a febrifuge and

expectorant." (*Assistant Surgeon Nundo Lal Ghose, Bankipore.*) "The juice of the fresh leaves has a laxative action." (*Surgeon K. D. Ghose, Bankoora.*)

Regarding the Root.—"The root is said by the people here to be an antidote against poisonous snake-bite." (*Surgeon C. J. W. Meadows, Burrisal.*)

"For habitual constipation, root-bark 1 oz., boiling water 10 oz.; dose 1 to 2 oz." (*Apothecary Thomas Ward, Madanapalle, Cuddapa.*)

FOOD.

The fruit when ripe is sweetish, wholesome, nutritious, and very palatable, and much esteemed and eaten by all classes. The ripe fruit, diluted with water, forms, with the addition of a small quantity of tamarind and sugar, a delicious and cooling drink. FOOD. 546

TIMBER.

Structure of the Wood.—Yellowish white, hard, with a strong aromatic scent when fresh cut; no heart wood, not durable, readily eaten by insects. Weight 40 to 50 lbs. (*Brandis.*) **Wallich** gives 49; **Mr. Gamble's** specimens averaged 57 lbs. TIMBER. 547

Used in construction for the pestles of oil and sugar mills, naves and other parts of carts, and for agricultural implements. The wood is also valued for making charcoal, but is not often used. (*Stewart, Pb. Pl.*) The wood is used in the Panch Mahâls for oil-mills.

Dr. Warth gives the following analysis of the ash composition of the wood of **Ægle Marmelos** in the *Indian Forester, Vol. X., p. 63*:—

Soluble potassium and sodium compounds . .	0·16
Phosphates of iron, calcium, &c.	0·13
Calcium carbonate	2·16
Magnesium carbonate	0·19
Silica with sand and other impurities . . .	0·01
Total ash .	2·65

DOMESTIC USES.

Domestic and Sacred Uses.—"The fruit is nutritious, warm, cathartic; in taste delicious, in fragrance exquisite; its aperient and detersive quality and its efficiency in removing habitual costiveness have been proved by constant experience. The mucus of the seed is for some purposes a very good cement. The fruit is called *Shriphula*, because it sprang, say the Indian poets, from the milk of *Shri*, the goddess of abundance, who bestowed it on mankind at the request of *Jowarra*, whence he alone wears a chaplet of *Bilva* flowers; to him only the Hindús offer them; and when they see any of them fallen on the ground, they take them up with reverence and carry them to his temple." (*Roxb., in As. Res., Vol. 2, 340; also quoted in his Flora of India.*) DOMESTIC USES. 548

"This is one of the most sacred of Indian trees, cultivated near temples and dedicated to *Siva*, whose worship cannot be completed without its leaves. It is incumbent upon all Hindús to cultivate and cherish this tree, and it is sacrilege to cut it down." (*U. C. Dutt, Civil Medical Officer, Serampore.*)

Birdwood, in his *Industrial Arts of India*, says it is sacred to the Trimurti, being a representative of Siva. It is also sacred to the Parvati, and is the *Vilva-rupra*, one of the Patricas, or nine forms of *Káli*. It is one of the trees the planting of which by the waysides gives long life. "Leaves used in enchantments." (*Irvine.*)

Snuff-boxes. 549 "In Peshâwar, large numbers of snuff-boxes for Afghans are made from the shell of the fruit, which is prettily carved over, and fitted with a small bone plug for the opening in the end, which serves as entrance and exit for the snuff." (*Stewart, Pb. Pl.*)

Medicine dishes. 550 The young dry shell is also largely used for medicine dishes and bottles.

ÆRIDES, *Lour.; Gen. Pl., III., 576.*

Orchids. 551 **Ærides**, a large genus of tropical orchids, of which **Æ. odoratum** is the most common, and at the same time most handsome species, growing freely and perfuming the orchid house. The leaves in this genus are distichous, channelled, and unequally truncate, but sometimes round. The flowers are large and frequently scented. **Æ. tœniale**, a native of Sylhet and Mánipur, has flat green rootlets, closely embracing the twigs upon which it grows, somewhat like a tape-worm, hence the specific name. **Æ. affine** and **Æ. odontochilum** are also met with in Assam and Sylhet, while in Western India occurs the spotted species, **Æ. maculosum**. None are known to be of economic value, although all are much prized as cultivated plants.

552

ÆRUA, *Forsk.; Gen. Pl., III., 34.*

A small genus of shrubs or herbs (placed in the Natural Order AMARANTACEÆ), comprising in all some 10 species; they are inhabitants of tropical Asia and Africa.

Erect or scandent, closely covered with a short white tomentum. *Leaves* alternate, opposite or almost whorled, linear oblong or obovate, entire. *Flowers* small or minute, arranged on terminal or axillary simple or panicled spikes, white or rusty; hermaphrodite, polygamous or diœcious, with one large and two small bracts, concave and persistent. *Perianth* of 5 (rarely 4) short leaves, oblong-lanceolate, acute or acuminate and very hairy. *Stamens* 5 (rarely 4); *filaments* often unequal, subulate, united at the base into a short cup. *Ovary* sub-globose; *style* short; *stigmas* 2 or capitulate. *Ovary* one-celled with a single ovule suspended from a long funiculus. *Seed* inverted, ovoid or reniform, compressed; *testa* thin, coriaceous; *arillus* wanting; *albumen* farinaceous; *radicle* superior.

553 **Ærua javanica,** *Juss.; Gen. Pl., III., 34; Wight, Ic., t. 876.*

Syn.—ACHYRANTHES INCANA, *Roxb., Fl. Ind., Ed. C.B.C., 225;* CELOSIA LANATA, *Linn.;* ACHYRANTHES JAVANICA, *Wight's Ic., t. 876.*

Vern.—Probably same as Æ. LANATA.

References.—*Voigt's Hort. Calcut., 317; Dals. and Gibs., Bomb. Fl., 216; DC. Prod. XIII., Part 2, 299.*

Habitat.—Common throughout the Peninsula, and in flower all the year.

Botanic Diagnosis.—An erect or ascending herbaceous plant, tomentose hoary. *Leaves* obovate-lanceolate, obtuse, shortly mucronate. *Spikes* solitary, sessile, ascending. *Calyx* a little longer than the acuminate one-nerved bracts.

554 **Æ. lanata,** *Juss.; Gen. Pl., III., 34; (Wight, Ic., t. 723?).*

Syn.—ACHYRANTHES LANATA, *Roxb., Fl. Ind., Ed. C.B.C., 227.*

Vern.—*Chaya,* BENG.; *Bhúi,* RAJ.; *Búi, jári,* SIND; *Búi-kallan* (flowers as sold in bazars), PB.; *Kul-ke-jar, khul,* DUK.; *Asmei, spirke, sassái,* TRANS-INDUS; *Kapur-madhura,* MAR.; *Sirrú-púlay-vayr,* TAM.; *Pindieconda,* TEL.; *Astmabayda,* SANS.

References.—*DC. Prod., XIII., Part 2, 303; Dymock, Mat. Med., W. Ind., 540; Murray's Pl. and Drugs, Sind, 101.*

Habitat.—Small, herbaceous weeds, common everywhere in the plains, ascending to 3,000 feet in altitude; from the Indus eastward to Bengal and Burma, and southward to the Madras Presidency.

Botanic Diagnosis.—A small, herbaceous plant, ash-coloured, and a

little tomentose. *Leaves* ovate, obtuse, shortly mucronate, pubescent on both sides. *Spikes* solitary or in twos or threes, sessile, horizontal. *Calyx* twice as long as the bracts.

Properties and Uses—

Medicine.—The flowering tops are officinal, and the roots are used in the treatment of headache, and by the natives of the Malabar coast are regarded as demulcent. The flowers are sweetly scented. (*Graham, Murray, &c.*) **MEDICINE. Flowering tops. 555**

§ "I am not aware of its being used medicinally in South India." (*Deputy Surgeon-General G. Bidie, C.I.E., Madras.*) **Roots. 556**

In Sind, **Stewart** says the woolly spikes are used for stuffing pillows; rats are fond of the seed. The stems are often covered with woody galls. **DOMESTIC USES. Woolly spikes. 557**

Ærua scandens, *Wall.; DC. Prod., XIII., pt. 2, 302.* 558

Syn.—Achyranthes scandens, *Roxb.; Fl. Ind. Ed. C.B.C., 227; Gamble's Trees and Shrubs, Darj., 63.*

Vern.—*Nuriya,* Beng.

Habitat.—A large climber, covering the tallest tree with its masses of handsome flowers and soft whitish leaves: common in the lower hills, ascending to 6,000 feet; Monghyr, the Terai, Kumaon, &c.

Botanic Diagnosis.—Stem sub-fruticose, climbing. *Leaves* elliptic-oblong, acuminate at both ends, mucronulate, pubescent, green.

ÆSCHYNOMENE, *Linn.; Gen. Pl., I., 515.* 559

A genus of herbs or shrubs (belonging to the Natural Order Leguminosæ), comprising some 30 species, distributed throughout the tropics.

Leaves odd pinnate with numerous sensitive leaflets. *Flowers* in sparse racemes. *Calyx* deeply two-lipped, the lips toothed. *Corolla* early caducous; *standard* orbicular; *keel* not beaked. *Stamens* in two equal bundles. *Ovary* stalked, linear, many-ovuled; *style* filiform, incurved; *stigma* terminal. *Pod* with a stalk longer than the calyx, composed of 4-8 joints, each one-seeded.

The name "Æschynomene" is derived from *αἰσχύνομαι,* to be ashamed. It was given to a sensitive plant (? a **Mimosa**) mentioned by Pliny, probably in allusion to its closing so readily on being touched. The genus to which the name is now applied belongs to the Sub-Order Papilionaceæ, not to the Mimoseæ. There are two Indian species.

Æschynomene aspera, *Linn.; Fl. Br. Ind., II., 152; Wight, Ic., t. 299.* 560

Syn.—Hedysarum lagenarium, *Roxb., Fl. Ind., Ed. C.B.C.*

Vern.—*Sola* or *shola, phul-shola,* Beng.; *Kuhilá,* Ass.; *Bhend,* Mar.; *Atunete, takke,* Tam.; *Nirjilúsa, bend,* Tel.; *Paukpan, paukbyu,* Burm.

Habitat.—A small, sub-floating bush, frequenting marshes and growing mostly during the season of inundation in Bengal, Assam, Sylhet, Burma, and South India.

Botanic Diagnosis.—*Stems* robust, swollen (often 2 inches in diameter, full of white light pith, with a central channel and a thin yellowish-grey bark, not more than $\frac{1}{16}$ inch in thickness), simple, rarely if ever branched, erect. Peduncles, calyx, and large corolla hispid.

Properties and Uses—

Fibre.—In Burma a fibre is obtained from the thin bark. **FIBRE. 561**

Domestic Uses.—The so-called pith or *sola,* however, is the most valuable product of the plant; it is largely used by fishermen for floats; it is cleverly cut up into paper-like sheets and made into temporary decorations for idols during certain festivities. Europeans use it for making hats **DOMESTIC USES. Floats. 562**

Hats. 563 Toys. 564 (*sola topís*) which, while being perfect protectors from the sun, are extremely light. The pith models of bullock-carts and other articles of Indian interest, made chiefly at Tanjore in Madras, are both curious and artistic. Sola is also made into a multitude of highly-coloured toys.

§ "A common weed in tanks. The soft and spongy pith is used as a substitute for sponge for the preparation of surgical lints which are used for widening the narrow openings of sinuses and abscesses, and also for dilating the rigid os uteri. If a piece of the pith, about an inch long and shaped like a cone with a sharp knife, be pressed between the fingers, it becomes very thin, and if inserted into the narrow opening of an abscess or sinus, it absorbs the moisture and swells up to its original size, and thus enlarges the opening without cutting." (*Hony. Surgeon Moodeen Sheriff, Khan Bahadur, Madras.*) "The pith of the stem can be used as a substitute for corks in medicine bottles." (*Brigade Surgeon G. A. Watson, Allahabad.*)

Æschynomene cannabina, *Retz.*

Syn. for **Sesbania aculeata,** *Pers., var.* **cannabina,** which see.

Æ. grandiflora, *Linn.*

Syn. for **Sesbania grandiflora,** *Pers.*, which see.

565 **Æ. indica,** *Linn.; Fl. Br. Ind., II., 151; Wight, Ic., t. 405.*

Syn.—HEDYSARUM NELI-TALI, *Roxb., Fl. Ind., Ed. C.B.C.*; SMITHIA ASPERA, *Roxb., Fl. Ind., Ed. C.B.C.*; Æ. KASHMIRIANA, *Camb.*; NELI TALI, *Rheed, Mal., IX., t. 18.*

Vern.—*Tiga jilúga,* TEL.

Habitat.—From the plains of Bengal to the lower hills; ascending in Kashmír to 5,000 feet and to 4,000 in Kumaon. Distributed to Ceylon, Siam, Japan.

Botanic Diagnosis.—Stems slender, much branched. *Peduncles* viscid; *calyx* small; *corolla* glabrous.

Apparently not put to any economic purpose.

Æ. Sesban, *Linn.*

Syn. for **Sesbania ægyptiaca,** *Pers.*, which see.

566 **ÆSCULUS,** *Linn.; Gen. Pl., I., 398.*

A genus of trees (belonging to the Natural Order SAPINDACEÆ), comprising in all only 14 species, natives of the temperate parts of Asia and America.

Leaves exstipulate, opposite, digitate, deciduous. *Panicles* terminal, thyrsoid. *Flowers* large, polygamous, irregular. *Sepals* and *petals* 4-5, unequal. *Disk* annular or unilateral, lobed or entire. *Ovary* sessile, 3-celled. *Style* elongated; *stigma* simple; *ovules* 2 in each cell, superposed. *Fruit* capsular, 1-3 celled; *valves* loculicidal, coriaceous; *cells* 1-seeded. *Seeds* exalbuminous, with a broad *hilum*; *testa* coriaceous; *cotyledons* thick, corrugated, conferruminated.

The generic name is derived from the Latin word *Æsculus*, given by Virgil and Horace to a tree believed to have been a species of Oak.

567 **Æsculus indica,** *Colebr.; Fl. Br. Ind., I., 675; Bot. Mag., t. 5117.*

THE INDIAN HORSE-CHESTNUT.

Vern.—*Torjaga,* TRANS-INDUS; *Háne, hanudán,* KASHMIR; *Gún, kanor* PB.; *Kishing,* N.-E. KUMAUN; *Bankhor, gugu, kanor, pánkar,* HIND.

Habitat.—A large tree, 60 to 70 feet in height, deciduous, found most abundantly in the North-West Himálaya, extending from the Indus to

Nepal, between 4,000 and 10,000 feet in altitude. It grows on any soil, and produces annually an abundant crop of nuts and elegant foliage.

Botanic Diagnosis.—*Leaflets* 7, acuminate and minutely serrate, distinctly petioled. *Panicles* oblong, nearly equalling or exceeding the leaves. *Flowers* secund. *Petals* 4, red and yellow, the place of the fifth vacant. *Capsule* ovoid, reddish brown, without spines, rough. *Seeds* dark. The bark peels off in long vertical strips, giving old trees a scaly appearance.

Properties and Uses—

Fodder.—The fruits are in the Himálaya eaten greedily by cattle, and in times of scarcity by men after being steeped in water, and sometimes mixed with flour. The leaves are lopped for cattle fodder. FOOD. Fruits. 568 FODDER. 569

Medicine.—The fruit is given to horses during colic. It is also applied externally in rheumatism, but for this purpose the oil is generally extracted from the seed. MEDICINE. The Oil. 570

Structure of the Wood.—White, with a pinkish tinge, soft, close-grained. Weight 34 lbs. per cubic foot.

It is used for building, water-troughs, platters, packing-cases, and tea-boxes; it is easily worked. TIMBER. 571

Domestic Uses.—Thibetan drinking-cups are sometimes made of it. DOMESTIC USES. Cups. 572

CULTIVATION.—The *Indian Forester*, February 1884, page 57, gives a useful and practical note regarding the rearing of this tree. It recommends that the seed should be collected in November or December, and sown in good rich soil in drills. In the following cold weather, when the young trees shed their leaves, they should be transplanted into lines, each seedling 18 inches apart. If kept free from weeds, by the following cold season they will be ready for re-transplantation into the forest.

Æsculus Hippocastanum, *Linn.; Fl. Br. Ind., I., 675.* 573

THE HORSE-CHESTNUT.

Vern.—*Pú*, PB. HIM. NAME (*Brandis*).

Habitat.—A well-known tree in Great Britain and in Europe generally. Is supposed to have been introduced most probably from Asia. It is found in Persia and the Caucasian region, in India only in a state of cultivation. The home of the common horse-chestnut is at present unknown.

Botanic Diagnosis.—*Leaflets* 7, digitate, the larger ones woolly when young, bi-serrate and with prominent lateral nerves. *Capsule* echinate.

As an ornamental tree for parks, pleasure-grounds, road-sides, and avenues in temperate countries, this is justly a great favourite. The avenue in Bushy Park, London, planted by William III., affords a fine example of the adaptability of the horse-chestnut for ornamental purposes. (*Smith's Dictionary.*) It is not particular as to soil.

Dye.—An extract from the wood is said to be used in imparting to silk a black dye. DYE. 574

Food.—The NUTS are variously utilised; in Turkey they are ground with other food and given to horses, hence the name; in France they are employed in the manufacture of starch; in Ireland they are macerated in water, and being saponaceous are used to whiten linen. FOOD. Nuts. 575

Medicine.—The fruit and bark have for long been regarded as useful in the treatment of fevers, as an antiperiodic. Esculine in doses of 15 grains is said to have been found most useful in malarial disorders. MEDICINE. 576

Chemical Composition.—The bitter principle of the fruit has been termed *esculin* and may be obtained by precipitation with acetate of lead. It forms shining, white, prismatic crystals, inodorous, bitter, slightly soluble in cold water. Its formula according to Schiff is $C_{15}H_{16}O_9$. When treated with dilute sulphuric acid it is converted into grape-sugar. Tannin is also found in all parts, the leaves and bark more especially.

577 **Æsculus punduana,** *Wall.; Fl. Br. Ind., I., 675.*

Syn.—Æ. ASSAMICA, *Griff.* (*Kurz, 286*).

Vern.—*Cherinangri,* NEPAL; *Kunkirkola, ekuhea,* ASS.; *Dingri,* DUARS; *Bolnawak,* GARO.

Habitat.—A moderate-sized, deciduous tree, found in Northern Bengal, in the Khásia Hills, Assam, and Burma, ascending to 4,000 feet.

Botanic Diagnosis.—*Leaflets* 5-7, shortly petioled. *Panicles* narrowly lanceolate, nearly equalling the leaves, lower pedicels longer. *Petals* white and yellow.

TIMBER. 578 **Structure of the Wood.**—White, soft, close-grained. Weight 36 lbs. per cubic foot. Rarely used.

579 **AFZELIA,** *Sm.; Gen. Pl., II., 580.*

A small genus of erect unarmed trees (belonging to the LEGUMINOSÆ) comprising only 10 species; distributed throughout the tropics of the Old World. *Leaves* abruptly pinnate, with few pairs of opposite leaflets. *Disk* at the top of a long calyx-tube. *Sepals* 4, unequal; only one *petal* developed, the others absent or rudimentary. *Stamens* 3-8, free; *filaments* long, pilose. *Pod* large, oblong, flat.

There are four Indian species—all, however, confined to the Straits and the Andaman Islands.

580 **Afzelia bijuga,** *A. Gray.; Fl. Br. Ind., II., 274.*

Vern.—*Shoondul, hinga,* BENG.; *Pynkado,* BURM., IN THE ANDAMANS *Pirijdá, dsagundá,* AND.

Habitat.—A moderate-sized, evergreen tree, found in the Sunderbans Bengal, Andaman Islands, and the Malay Archipelago.

TIMBER 581 **Structure of the Wood.**—Sapwood white, moderately hard, relatively large in young trees. Heartwood reddish brown, hard, close-grained. Weight: young wood, 36 to 42 lbs.; old wood, 45 to 49 lbs. (*Brandis, Memorandum on Andaman Woods,* 1874, Nos. 12 and 13, gives 50 lbs.)

A valuable wood, used in the Andamans for bridges and house-building. It is, however, very little known in India.

Agallocha, see **Aquilaria Agallocha,** *Roxb.;* THYMELÆACÆ.

THE EAGLE-WOOD; ALOES-WOOD; CALAMBAC-WOOD; AGILA; AKYAW.

Agallocha, see also **Excæcaria Agallocha,** *Willd.*

582 **AGANOSMA,** *G. Don; Fl. Br. Ind., III., 663; Gen. Pl., II., 717, reduces this genus to* **Ichnocarpus.**

A genus of APOCYNACEÆ, belonging to the sub-tribe EUECHITIDEÆ, comprising some 5 species; confined to India and the Malaya. Nearly allied to ICHNOCARPUS, the æstivation of the corolla separating them.

Flowers in terminal tomentose cymes, large or middle-sized. *Sepals* narrow lanceolate-acuminate, with subulate glands at the base. *Corolla* salver-shaped, *tube* short, *throat* naked, except with longitudinal bands behind the anthers; *lobes* lanceolate to linear oblong or broad and rounded, in bud overlapping to the right and then straight. *Stamens* included; *anthers* sagitate, conniving over the stigma and adnate to it; *cells* spurred at the base. *Disk* 5-lobed. *Carpels* 2, distinct, hirsute, many-ovuled. *Follicles* short or long, terete, straight or curved, linear. *Seeds* ovate linear-oblong, flattened, glabrous, not beaked.

583 **Aganosma calycina,** *A. DC.; Fl. Br. Ind., III., 664.*

Syn.—ECHITES CARYOPHYLLATA, *Roxb.;* E. CALYCINA, *Wall.;* BURGHII, *G. Don, ex Wight, Ic., t. 440.*

Habitat.—An evergreen, scandent shrub, met with in the forests of Tenasserim, flowering in September.

Botanic Diagnosis.—*Leaves* elliptic-oblong, acuminate, glabrous, 7-10 pairs of arching, slender, impressed nerves. *Cymes* terminal, lax-flowered, densely rusty-tomentose. *Sepals* $\frac{3}{4}$-1 inch long, eglandular. *Petals* ovate-acute. *Ovary* quite glabrous.

Aganosma caryophyllata, *G. Don; Fl. Br. Ind., III., 664.* 584

Syn.—ECHITES CARYOPHYLLATA, *Wall.; non Roxb.*
Vern.—*Málati*, HIND., BENG., and SANS. **Voigt** gives *Gandhomálati* as the Bengali name.

Habitat.—Lower Bengal (Monghyr, *Hamilton*); common on rocks at Risikund (*Wallich*), Deccan Peninsula (*Heyne*), &c.

Botanic Diagnosis.—*Leaves* ovate-acute, obtuse or acuminate, glabrous or tomentose, nerves red-coloured, 3 pairs, very oblique. *Cymes* lax-flowered, pubescent; *pedicels* shorter than the sepals; *sepals* glandular within. *Corolla-lobes* obliquely orbicular. *Ovary* hairy at the tip.

Properties and Uses—

Medicine.—The only mention I find of **Aganosma** being medicinal is in *U. C. Dutt's Materia Medica*, where it occurs in his Glossary of Indian medicinal plants mentioned by Sanskrit writers. He does not give its supposed properties, but states that the vernacular name for **A. caryophyllata**, *G. Don*, is *Málatí*, whereas all other writers give that as the vernacular name of **A. calycina**, *DC.* It seems, therefore, that the plant has not been carefully identified by the author of the *Hindú Materia Medica.* MEDICINE. 585

§ "According to Sanskrit authors this plant is heating and tonic; useful in diseases caused by disordered bile and blood." (*U. C. Dutt, Civil Medical Officer, Serampore.*)

A. cymosa, *G. Don; Fl. Br. Ind., III., 665.* 586

Habitat.—A stout, rambling climber, met with in Sylhet, and also in the Western Peninsula from Bombay to Travancore.

Botanic Diagnosis.—*Leaves* acute or finely acuminate. *Cymes* dense-flowered, rounded, densely tomentose. *Sepals* $\frac{1}{4}$-$\frac{1}{2}$ inch long. *Corolla-tube* $\frac{1}{6}$-$\frac{1}{5}$ inch; *petals* ovate-acuminate.

A. marginata, *G. Don; Fl. Br. Ind., III., 663.* 587

Habitat.—A large, evergreen, scandent bush, met with in Sylhet, Chittagong, Tenasserim, Malacca, and distributed to Java, Sumatra, and the Philippine Islands.

Botanic Diagnosis.—*Leaves* oblong-acute, acuminate or caudate, nerves very strong beneath, accurately uniting towards the margin. *Cymes* lax. *Corolla* glabrous, tube rather longer than the acute calyx-segments; *lobes* linear-obtuse.

Structure of the Wood.—Light, coarsely fibrous, close-grained, soft, and pale coloured (*Kurz*). TIMBER. 588

Agar-agar or **Ceylon Moss,** see **Gracilaria lichenoides,** *Greville*, LICHENES.

AGARICUS, *Linn.; Syst. Nat., 1735.* 589

A large and important genus of FUNGI, referred to five series, each containing a number of sub-genera. *Spores* of various colours. *Gills* membranaceous, persistent, with an acute edge. *Trama* (the layer of tissue which separates the gills at their union to the pileus) floccose, confluent with the inferior hymenium. Fleshy fungi, which, on being dried, putrefy and cannot again be revived.

Series I.—Leucospori—Spores white.
Series II.—Hyporhodii—Spores pink.

The Mushroom.

Series III.—Dermini—Spores brown.
Series IV.—Pratellæ—Spores purple.
Series V.—Coprinarii—Spores black.
Each of these is again sub-divided into—
* Hymenophore, distinct from the fleshy stem.
** Hymenophore, confluent and homorogenous with the fleshy stem.
*** Hymenophore, confluent with but heterogenous from the cartilaginous stem.

More than 1,000 species are known and referred to AGARICUS, the typical genus of the Order. (*Cooke, Hand-Book Br. Fungi.*)

590 **Agaricus campestris,** *Linn.*

THE MUSHROOM.

Vern.—*Kat phula,* ASS.; *Alombe, kalambe,* BOMB.; *Mánskhel* KASHMIR; *Moksha,* CHAMBA; *Kuti leubhá, khumha* SIND.; *Kagdana chhatra,* GUJ.; *Chattrak,* SANS.; *Khúmbah, khúmbúr, chattri,* AFG. BAZAR NAMES; *Ot,* SANTH; *Kúmbh samarogh* (**Stewart**), *Herar,* Poisonous forms. *Kullalic-div* (Fairies' cap), also *chatr-i-már* (Snake's umbrella) and *samárugh,* PERS.

Habitat.—There are in India several species of fungi eaten indiscriminately, but as these have not as yet been botanically determined, it is preferable to refer to all under the common name which in English they would doubtless receive, *viz.*, The Mushroom.

Botanic Diagnosis.—"*Pileus* fleshy, convexoplane, dry silky floccose or squamose, stem stuffed, even, white; *ring* medial, somewhat torn; *gills* free, approximate, ventricose, sub-deliquescent, flesh-coloured, then brown." (*Cooke.*) This species belongs to the series PRATELLÆ and the sub-genus PSALLIOTA.

Chemical Composition.—Interesting information regarding the chemistry of certain species of AGARICUS will be found in the *Year-Book of Pharmacy, 1877, p. 142; 1881, p. 147.*

§ "**Dr. N. Chevers,** in his work on *Indian Medical Jurisprudence,* refers to a case in which symptoms closely resembling those of intoxication rapidly ensued after eating mushrooms, and the author, therefore, considers it probable that there exists in Bengal a fungus which closely resembles an edible variety in form and colour, but which contains *amanitine* or *muscarine,* the poisonous principle of the **Amanita Muscaria.** *Amanitine* is stated also to exist in **A. bulbosus** and **A. volvaceus.** This principle sometimes acts as an irritant, at other times as a narcotic or narcotous acrid, and the symptoms may be developed within a few minutes, or not for several hours. Muscarine is described as being soluble in water, and appears to be a somewhat stable compound. Its action upon the system is opposite to that of atropine. (*Jour. Ph. Soc.*) The **A. Muscarius** or fly mushroom is in England most frequently found in fir or beech woods. It has a rich vermillion pileus studded with white or slightly yellowish warts, white gills, and tall, white stem, swollen at the base into a bulb, and furnished with a ring a short distance below the pileus. This fungus is used in Siberia as an intoxicating agent, and one or two suffice to produce pleasant intoxication for a whole day. (*Spons' Encycl.*) Some persons through idiosyncracy are injuriously affected by ordinary edible varieties, the effects being usually confined to colic, purging, and vomiting. (*Parg.*) Edible mushrooms contain a non-saponifiable, buttery, fat Agaricin. (*Lefort.*) The recent researches of **Dupetit** indicate that all edible mushrooms contain a poisonous principle, which resembles the soluble ferments and not the known alkaloids. The poisonous principle is destroyed at a temperature of 100° C. and the mushrooms rendered innocuous. This author has also obtained two alkaloids from edible mushrooms." (*Surgeon C. J. H. Warden, Professor of Chemistry, Medical College, Calcutta.*)

Properties and Uses—

FOOD

Food.—In many parts of India, especially in the Panjáb, the true Mushroom is abundant in fields. It is universally eaten by the natives, fresh or dried in the sun. It is apparently a very common plant in Afghanistan. **Aitchison** mentions **A. Mitto**, *Pers.*, as met with in Kúrum district; he also mentions **Morchella esculenta, Helvella crispa,** and **Hydnum coralloides** as eaten by the Afghans, the last-mentioned being collected in August, and sun-dried.

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The common mushroom, says **Dr. Stewart**, is abundant in cattle-fields in many parts of the central Panjáb after the rains, and is also frequent in the desert tracts of central and southern Panjáb. It is largely eaten by the natives, and is described as excellent and equal to the English mushroom by those Europeans who have eaten it. It is also extensively dried for future consumption, and is said to preserve its flavour tolerably well. Mushrooms are largely used in Europe in the manufacture of ketchup. A trade in Panjáb mushrooms might easily be established were they to be improved in quality by cultivation.

It may not be out of place to mention here a few of the characters by which a wholesome fungus may be recognised:—

1st—Wholesome fungi are found growing in fields or in open grassy places in forests.

2nd—They are scattered, each rising direct from the ground; never collected into clumps nor found growing upon trees.

3rd—The stem should break easily when touched; it should spring from the centre of the pileus. The cap should be thick relatively to the gills.

4th—They should not be acid in flavour nor smell. No fungus is so poisonous but that this test may be put into force; but it does not follow an acid fungus will be poisonous; indeed, **Hydnum repandum** and **Cantharellus cibarius** are both acid, yet are excellent articles of food. A hot burning taste or acid flavour should, however, as a rule, be avoided.

5th—The bright rosy or pink gills and the absence of any yellow stain when bruised are two good tests.

The natives of India seem to eat any fungus, and, indeed, if properly cooked, few are dangerously poisonous. If macerated in vinegar before being cooked, and if eaten with plenty of bread, there is almost no danger. It is a good practice with any acid or doubtful mushroom to slice it into hot water, and then to press the slices in a cloth before stewing. The Russians preserve mushrooms in salt, but this is far from destroying their poisonous property, witness the death of the wife of the Czar Alexis I. from eating mushrooms in Lent. The narcotic poison in certain fungi resembles, in its action, Indian Hemp. No antidote has as yet been discovered for this poison.

Medicine.—The small dried mushrooms are officinal in the Panjáb, and are sold as "*Mokshai*," being regarded as alterative. MEDICINE 595

§ "The cultivation of several indigenous varieties of mushroom is of importance for supplying an excellent nutritive food for European convalescents. There are many valuable varieties procurable in the plains of India. Even Truffles—white and black—I have seen in abundance at Bankura. In taste and flavour they are not inferior to the French plant. They grow under the soil below 'Sal' trees, and are dug out by the Santals." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*)

"Common in South India, and used by the natives." (*Deputy Surgeon-General G. Bidie, Madras.*)

The following species are also mentioned by Indian writers on Economic

AGARICUS igniarius.

The Garikún.

plants; but the subject is at present too imperfectly known to admit of more than the enumeration of the names used by authors. It is hoped that this confession of want of definite information, regarding the edible and officinal Asiatic fungi, may bring about an investigation of what, both economically and scientifically, cannot fail to prove valuable and instructive.

596 **Agaricus igniarius** and **A. albus** are referred to by **Dr. Stewart** in his *Panjáb Plants;* **Polyporus igniarius** by **Dr. Irvine,** and **P. officinalis** by **Dr. Dymock.**

Vern.—*Bulgar jangli,* KASHMÍR; *Búti-ka-mochka,* CHENAB; *Kiain,* PB.; *Ghárikún,* a BAZAR NAME.

MEDICINE. 597 **Medicine.**—**Stewart** remarks: "This appears to come from the west, about 15 seers being annually imported *viâ* Peshâwar." It is officinal, being given for internal disorders. The tinder or ashes are also said by **Honigberger** to be used to stop hæmorrhage. **Dr. Irvine** in his *Short Account of the Native Materia Indica of Patna* describes what in all probability is the same as the above species under the name of **Polyporus igniarius.** He gives it the HINDI name *garigond* and the ARAB. *Agarikún,* and describes the drug as "used as a styptic externally, and internally as a bitter tonic and laxative." He gives the dose as one to five grains, and says that it fetches the extraordinary price of R26 a lb. This is most probably the same plant as **Dr. Dymock** describes under the name of **Polyporus officinalis,** the *Garikún* of Bombay, which he says is largely imported from the Red Sea and the Persian Gulf ports into Bombay, and is much used by hakims.

"This is the *Agaricon* of **Dioscorides** and the white *Agaric* of European medicine." "It is commonly kept by native druggists, being an important article in the Materia Medica of the Mohammedans, who prescribe it in a great number of disorders, but generally in combination with other drugs. According to their hakims it acts principally by expelling cold and bilious humors." (*Surgeon-Major Dymock, Mat. Med., W. Ind., 702.*)

Hanbury, in his *Science Papers,* p. 184, speaking of what appears to be the same as the above fungus, says: "During the Middle Ages it was exported from Asia Minor; and in the Paris Exhibition specimens from this region—that is to say, from the Gulf of Adalia—were exhibited. What is the tree from which this Asiatic Agaric is obtained? It is found upon the larch in Northern Russia."

§ "*Garikún* acts as a purgative, and is used in disorders of the liver and kidneys. Diuretic and emmenagogue properties have also been assigned to it. It has been employed with benefit in cases of gravel in the bladder. It is used as a gargle in affections of the throat, gums, and teeth. In combination with liquorice, it is employed in chronic bronchitis and asthma, and with syrup of vinegar, in jaundice and enlargement of the spleen. It is said to be of much repute as a safeguard against scorpion-bites. In large doses it acts as a poison. *Jund-i-bedastur* is said to be its antidote." (*Asst. Surgeon Gholam Nabi.*)

"**A. albus** furnishes a principle *agaricin* which was formerly renowned as a specific for lessening the night sweats of phthisis. It is again coming largely into use." (*Surgeon-Major E. G. Russell, Calcutta.*) "It is diuretic, laxative, and expectorant. In very small doses it is a nervine tonic." (*Assistant Surgeon J. N. Dey, Jeypore.*) "A large fungus is imported as a medicine from Central Asia to Leh and Kashmír, and is called *Gari-kún.*" (*Surgeon-Major J. E. T. Aitchison, Simla.*)

From the conflicting opinions received from most parts of India, it seems that a number of widely different species of fungi are imported

into and sold in India as *Gari-kún*. Until this subject can be thoroughly and scientifically investigated, it has been thought advisable to publish in one place all notices regarding *gari-kún*. It seems probable that most of the forms of *gari-kún* belong to the Polyporus group of fungi and not to Agaricus. For further particulars regarding other Indian fungi, see **Polyporus, Morchella,** &c.

Agaricus ostreatus, *Jacq.* 598

Vern.—*Phanasa-alambé*, or vulgarly *phansámba*, CUTCH, BOMB.

"This is a dark, snuff-coloured fungus, which grows upon the stumps of old jack-trees (*Phanas*). It consists of a short, thick stalk, which supports a flat woody pileus, having a considerable resemblance to an oyster-shell, and consisting of a number of laminæ, upon the under-surface of which is situated the hymenium."

Medicine.—"*Phanas-alambé* is ground to a paste with water and applied to the gums in cases of excessive salivation. It appears to have much the same properties as *Amadou*, and to be a useful styptic." (*Surgeon-Major Dymock, Mat. Med., W. Ind., 704.*) MEDICINE. 599

§ "Useful in stomatitis." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*)

Food.—The species is edible. FOOD. 600

Agathotes Chirata, *D. Don*, see **Swertia Chirata**, *Ham.*; GENTIANACEÆ. THE CHIRETTA.

AGATI, *Desv.; Gen. Pl., I., 502.* 601

A generic name, formerly applied to one or two species of plants, now reduced to the section AGATI under the genus SESBANIA (Natural Order LEGUMINOSÆ). They differ from the type of the other SESBANIÆ chiefly in having larger flowers with the flower-bud falcately recurved.

Agati grandiflora, *Desv.*, or **Æschynomene grandiflora**, *Linn.; Roxb.;* **Coronilla grandiflora**, *Willd.;* see **Sesbania grandiflora**, *Pers.*, LEGUMINOSÆ.

AGAVE, *Linn.; Gen. Pl., III., 738.* 602

The name of a large and important genus belonging to the Natural Order AMARYLLIDEÆ. There are several species, all originally natives of Central America, and chiefly of Mexico. They are now, however, widely acclimatised in most warm, temperate, or sub-tropical and tropical countries—in Spain, Italy, Africa, Western Asia, and India. They are first mentioned in Europe in 1561, and are supposed to have been introduced into India by the Portuguese. They are commonly, but erroneously, called American Aloes. From the Aloë proper they are botanically separated by the position of the ovary, which is inferior in the Agave but superior in the Aloë. Like the Aloes, however, they consist of a crowded whorl of thick, fleshy leaves, more or less spirally arranged on the top of a short stem, which, in the majority of species, rarely rises much above the level of the ground. Along the margins are arranged sharp prickles, and each leaf ends in a formidable apex, long, sharp, and spear-like. In most species so closely do the leaves in the bud embrace each other, that each impresses its outline upon the fleshy substance of the other, forming a graceful variation on the otherwise smooth, glaucous surface. In cultivation several species become variegated in colour, the most striking being one with golden bands along the leaves. They take several years to reach the flowering stage, and from the fact that in adverse circumstances their development may be retarded from 10 to 50 or even 100 years, they are popularly called the Century Plants. When about to

The Century Plant or American Aloe.

flower, an axis is developed from the centre of the rosette of leaves, and rising at the rate of from 5 to 10 inches a day, it often attains the height of 20, 30, or even 40 feet. Thereafter it produces its flowers from subdivisions, and continues to do so for over a month. After flowering and seeding the plant dies, but from the ground daughter off-shoots spring up, and thus a hedgerow of Agave continues to flower year after year.

Generic Diagnosis.—*Leaves* thick, fleshy toothed and spiny, crowded on the apex of a short, erect, succulent stem. *Scape* rising from the centre of the leaves, erect often becoming very high and rapidly developed, branching towards the upper third into an immense thrysiform panicle. *Flowers* fascicled on the branches of the panicle, greenish white, erect. *Perianth tube* often very short, split into 6 sub-equal lobes. *Stamens* longer than the perianth upon which they are inserted; *filaments* tapering above, flattened below. *Ovary* inferior, globose-ovoid, often fleshy, 3-celled; *ovules* numerous on the central angle on each cell and 2-seriate; *style* filiform at the base, 3-celled like the ovary.

The genus Fourcroya is so nearly allied to that of Agave, that the various species are popularly viewed as mere varieties of **A. americana**. All that can be said regarding the fibre of the species of Agave is equally applicable to the fibres from the species of Fourcroya. Indeed, the reports of Aloë fibre cultivation are uniformly written in what may be briefly described as commercial language, and it is quite impossible to discover whether the good or bad varieties mentioned by writers on the subject are different species of Agave, or even of Fourcroya, or merely all local and accidental varieties of **A. americana**. It has been repeatedly observed that aloe fibre plants change their character when taken from one country to another, and at the present moment it is next to impossible to arrive at any definite knowledge regarding the species and varieties cultivated for their fibre. The foregoing diagnostic characters of Agave, if compared with Fourcroya, should help, however, to remove ambiguity regarding the forms of the so-called American Aloë fibre. An important step would be taken were the fibre-yielding plants to be carefully referred to their respective genera. The account of **A. americana** in the succeeding pages should be viewed more as aloë fibre plant, since it seems probable that the name **A. americana** is popularly given to a series of species and varieties yielding allied fibres.

The generic name is derived from the Gr. ἀγαυός, illustrious or admirable, in allusion to the stately form of the flowering stem.

603 **Agave americana,** *Linn.*; AMARYLLIDEÆ.

THE CENTURY PLANT, THE AMERICAN ALOE, THE CARATA, *Eng.*; PITA or MAGUEY, *Sp.*

Vern.—*Rakas-pattah, banskeora, bara kanwar, kantala, hathi-sengar, rám kantá*, HIND.; *Jungli* or *bilati-ánanásh*, vulgarly (*ánarás*), *banskeora, bilatipát, koyan*, incorrectly called *murga murji*, BENG.; *Wilyati kaitalu*, PB.; *Kantala*, SANS.; *Seubbára*, ARAB.; *Párkánd*, MAR.; *Rakas-patta*, DUK.; *Jangli-kunvára*, GUJ.; *Anaik-kat ráshai, pitha kalabuntha*, TAM.; *Rákáshimatalu*, TEL.; *Panam-katrásha*, MAL.; *Bhuttále, budukattalenaru*, KAN.; *Kétgí*, HYDERABAD (a name applied in other parts of India to Pandanus).

References.—*Roxb., Fl. Ind., Ed. C.B.C., 296; Royle, Fib. Pl., 41-50; Christy, New Com. Pl., 45-47; Drury, Us. Pl., 21; Lindley and Moore's Treasury of Botany; Smith's Dict., Econ. Pl.; Spons' Encycl.; Official Correspondence.*

Habitat.—Originally a native of America; naturalised in many parts of India. While plentiful throughout the country, the Agave nowhere occurs gregariously. In the Madras Presidency several varieties are extensively

used for hedges to protect the railways, and in many of the hotter portions of Central India they grow where scarcely anything else grows, and, as hedges, serve the valuable purpose of checking the translation of sand and surface soil by the hot winds, which for some months sweep across the dry arid tracts. As has been remarked, they " stand isolated in the midst of dreary solitude, and impart to the tropical landscape a peculiarly melancholy character." It is one of the most remarkble features of the Agave that, while thus luxuriating under warm, tropical influences, it is equally at home on the hills under widely different climatic conditions. This strikes the traveller forcibly when, after hurrying across the tropical plains of Madras, with their interminable hedges of Agave and Cactus, he finds, on the hills amid a temperate vegetation, equally luxuriant hedgerows of Agave.

If planted at regular distances, with a ditch on one side so as to carry off the excess of moisture, the plant will thrive under the greatest variations of temperature, ascending .in India to the altitude of the tea plantation, where it is largely employed as a hedge.

Synopsis of the Properties and Uses of Agave.

The LEAVES and the ROOTS yield an excellent fibre, generally known as Pita, American Aloë Fibre, or Vegetable Silk. The word Pita is, by some authors, restricted to a form which appears to be a variety of this species. The large, moist, fleshy leaves are sometimes used as a poultice. They are occasionally used as fodder.

The ROOTS are diuretic and antisyphilitic, and are said to find their way to Europe mixed with Sarsaparilla. **Prescott**, in his *History of Mexico*, says that when properly cooked the root affords a " palatable and nutritious food."

The SAP.—If the central bud be lopped off at the flowering season, the cut stem discharges freely a sour liquid, which ferments rapidly and forms the Pulque Beer of the Spaniards, or, by distillation, a kind of brandy known as Mexical.

The EXPRESSED JUICE of the leaves is administered by American doctors as a resolvent and alterative, especially in syphilis. It may also be used as a substitute for soap.

The FLOWERING STEM, dried and cut into slices, may be used as natural razor-strops, or as a substitute for cork. Wall plaster, impregnated with the expressed juice, is said to be proof against the ravages of white-ants.

THE GUM.

It is stated that in America a gum exudes from the leaves, which in some respects resembles gum arabic. It contains a much larger proportion of lime and is only partially soluble in water. The soluble portion resembles gum arabic, and the insoluble, gum bassora (*U. S. Dispens., 15th Ed.*). The exudation of gum has apparently not been observed in India. GUM. 604

THE SAP AND JUICE.

The Sap and the Spirit.—In their *Treasury of Botany*, **Lindley** and **Moore** state that " the most important product of the Agave, and especially of **A. americana**, is the sap," and that many varieties of this species are " common everywhere in equinoctial America, from the plains even up to elevations of 9,000 or 10,000 feet." The sap is further stated to have given a net revenue of £166,497 from three cities.

In the *Pharm. Journal, 3rd series, V., 461*, occurs an interesting article upon Agave by **Mr. J. R. Jackson**, an abstract of which will be found in the *Year-Book of Pharmacy for 1875*, from which the following passages have been extracted: " The juice forms a large article of internal

trade in Mexico. The plant is known as the Maguey, or 'tree of wonders,' and even at the present time, in some parts of Mexico, it is considered one of the most important productions of the soil. The use of the juice of the plant as an intoxicating beverage, is said by some to date back to the days of the early inhabitants of the Mexican Continent.

"SEVERAL VARIETIES OF THE PLANT are cultivated in Mexico, each being known for the greater or lesser quantity of the juice it produces, its colour, whether yellow or greenish, its thickness or sweetness or bitter taste. These variations as to the properties or consistency of the juice depend a great deal upon the nature of the soil and of the range of temperature; thus it is the least mucilaginous in a somewhat clayey soil, and is cultivated with the greatest success at an elevation of about 9,000 feet.

"THE MODE OF PROPAGATION is by removing the young plants or suckers from the old ones, and after spreading them on the ground for two or three months to partially dry them, so that they may not rot instead of starting into growth; they are planted in rows, and barley sown between them, which is considered rather to assist their growth. In a good soil, the Agave plant requires a period of from 10 to 12 years before attaining maturity. The plant upon attaining its full growth, which is easily discernible by its height and the prodigious extension of its leaves, brings forth a tall stem crowned with yellow flowers, and then a certain amount of pruning becomes necessary, so as to form a kind of reservoir in the centre, and what is technically termed a *cara* or 'face' around it, so as to cause the juice to flow towards the same spot, and to facilitate the extraction of it by removing some of the interior leaves and thorns.

PULQUE. 605 "TO COLLECT THE JUICE or *pulque*, as it is called, as soon as the leaves begin to turn yellow, a small concave aperture is scooped in the core of the plant, and an elongated tube-like gourd, the air in which is exhausted by suction, is thrust into the aperture; each labourer carries with him, strapped to his back, an impervious sheepskin bag, into which the gourd tube is emptied as soon as it is filled. The juice is emptied into vats, and allowed to stand for about 36 hours, when fermentation ensues, and its yellow transparent colour changes into a milky white.

TRADE IN PULQUE.—" Not less than 20,000 mules and donkeys laden with the beverage enter the city of Mexico every month by the gate leading to the Maguey district. To the quantity paying duty must also be added a considerable quantity which is smuggled in, and including this it may be calculated that about 50,000,000 bottles are now annually introduced into the city of Mexico.

MEXICAL SPIRIT. 606 BRANDY. 607 SUGAR FROM AGAVE. 608 VINEGAR FROM AGAVE. 609 MEZCAL OR MEXICAL SPIRIT.—" Besides this *pulque*, which, as we have seen, is the chief product of the *Agave* in Mexico, a strong spirit is prepared from the sap, known as *mezcal*, also a kind of brandy of 80 degrees of strength, a sweet, thick substance resembling honey, a concentrated gum used in medicine, brown sugar, loaf-sugar, sugar-candy, and vinegar of very excellent quality, so that the *Agave*, the value of which to us is mostly for its fibre, is, in fact, one of the most important economic plants of Mexico." (*Year-Book of Pharm., 1875, 232; also 1882, 221.*)

THE AMERICAN ALOE FIBRE.

FIBRE. 610 **The immense and growing demand for new and cheap textile materials has recently caused the fibre greatly to surpass the sap in importance. In fact, the latter may be said to be unknown to the natives of India. It is much to be regretted that the same might almost be said of the fibre, although various species of Agave are now widely cultivated, if not naturalised, in India.**

The American Aloe Fibre.

AGAVE americana.

Flourishing under the most diverse circumstances, the Agave is in India eminently suited for providing a supply of fibre, if not for trade and exportation, at least for domestic purposes. Every encouragement should therefore be given to develope an interest in this most useful plant. In America rapid progress is being made in this direction, and it is evident that, with the American inexhaustible supply, and with improved machinery, the Pita fibre must, sooner or later, affect certain branches of the jute and other textile industries. For cordage it is now held in high esteem, and the manufacturers assert that the fibre imported into England from America improves every year. It is composed of large filaments, white, brilliant, and readily separated by friction without danger to the fibre. It takes colour freely and easily. It is light, contracts under water rapidly, and becomes fixed, while it bears changes of humidity even more severe than can be resisted by the best hemp. In London the aloe fibre generally fetches from £35 to £40 a ton.

In Mauritius, Agave fibre has attracted considerable attention within the past few years, the sterilization of the soil, through constant cultivation of sugarcane, having forced upon the planter the necessity of adopting some new and less exhaustive crop. There are already some six companies in existence, with a capital of £150,000, working the fibre, which they appear to extract chiefly from **Fourcroya gigantea** ("The *green aloe*"), the fibre of which they export to Europe under the name of "Mauritius Hemp."

Cultivation.

The Agave is planted about 5 feet apart, and the furrows 5 feet distant from each other, so that an acre would contain from 1,600 to 2,000 plants. When about 7 to 8 years old the cutting may commence, but by planting with off-shoots this need be only some 3 or 4 years after the opening up of the plantation. They will continue to yield for four or five years. The Superintendent of the Hazaribagh Jail, **Dr. R. Cobb**, furnished the following report detailing the process adopted by him in the cultivation of the fibre, which is here published in the hope that it may prove useful to interested persons:—

"*Growth from seed.*—It may be grown from seed collected from the tall candelabra-like stems thrown up by the plant after it has reached the age of from five to seven years. The seed should be planted in a nursery in rows, 18 inches apart, and the seeds 12 inches from each other. The best time to plant them (in Hazaribagh) is during the rains; they will then rarely fail to germinate, and throw out leaves three or four inches long by the end of the year. If, however, they are put down in the dry season, they require watering at least twice a week. The young plants should be allowed to remain in the nursery till the following rains, when they may be transplanted to the hedge or plantation where they are intended to grow.

"*Growth from shoots.*—This is the best method, because there is no chance of failure of germination, the labour of sowing is saved and much time is gained. Young plants from one to two years old should be procured at the commencement of the rainy season, and put down where they are intended to grow permanently. If for hedgerows, a ditch should be dug, and the young plants put on the top of the earth thrown up. They should not be closer than two feet from each other. The holes in which they are placed should be eight inches in depth, and the earth should be well pressed round them. No further care is then required, and in about three or four years the plants will grow quite close together and make an excellent fence. If it is intended to make an aloe plantation, the young shoots should be planted in rows, ten feet apart, and five or six feet should be allowed between each plant in the rows.

A. 610

AGAVE americana.

The American Aloe Fibre.

"*Soil.*—A gravelly or laterite soil appears to be best suited for the growth of the aloe plant. If he plantation is made on high ground, it is not necessary to make ridges to plant on, and the plant is quite as prolific of young shoots, for experience has shown that they do equally well in the flat; but in low situations and hollows it is necessary to make ridges 12 to 18 inches high, the plant being very partial to a light dry soil, while a damp and water-logged soil is death to it. No manure is required, and it grows on the most stony ground, where apparently there is not sufficient soil to support life in the plant. In some places it may be seen growing in the clefts of the rocks. We have not found it necessary to hoe or dig up the land near the plants, and weeds, grass, &c., do not appear to interfere with its growth. From experiments which have been made here, the use of the expressed juice of the leaves, as manure, has appeared to accelerate the growth of the plants.

"*Cutting the leaves.*—The leaves should not be cut until the aloe is six or seven years old, after it has thrown up its tall candelabra-like stem; some of these grow to the height of 18 or 20 feet; they flower and produce seeds: before these are thrown up the fibre is weak and not fit for manufacture.

"*Protection of plantation.*—It is commonly supposed that cattle will not eat the aloe plant on account of its sharp pointed leaf and acrid sap, but our experience has shown this to be an error. Several growing plants have had their leaves eaten, and very young plants have been found cropped close to the ground. It is advisable, therefore, to keep off cattle by means of a ditch (outside) and a close aloe hedge round the plantation.

"*Value of crop per acre.*—After the plants are seven or eight years old, one acre of land may be expected to yield seven maunds of fibre per annum (it requires as much as forty maunds of leaves to make one maund of fibre). There is no doubt about this, as repeated experiments have been made in this jail. After the ground has been planted, no expenditure is required, and the cost of planting depends greatly on the distance from which the plants have to be brought.

"*Preparation of fibre.*—After the leaves are cut they are put through a crushing machine, invented by my jailor, Mr. Pimm, which breaks the hard bark of the leaf and crushes out the juice. It has been found that a great deal of manual labour is saved by this process. The machine is not unlike a sugar-crushing machine. This process should be carried on as near water as possible. Then the crushed leaves are pounded on a smooth stone by a wooden mallet until all the bark and woody matter are removed. The fibre is then washed until the whole of the sap and dirt is cleared out of it. It is dried in the sun and is then ready for use."

MANUFACTURE AND TRADE.

MACHINERY FOR AGAVE FIBRE.

M. Evenorde Chazal has recently published a most interesting account of the cultivation of the plant, and separation of the fibre, as practised in Mauritius, from which it would appear that the machinery used costs originally from £1,000 to £1,200, apart from the necessary buildings, roads, and purchase of land. From the outturn per acre, generally published at from 40 to 70 tons of green leaf, yielding about 1½ tons of fibre, valued at £40 per ton, it would take some four or five years before an Agave (or aloe) fibre-extracting factory could give any returns to the capitalist. It must not be overlooked, however, that a large part of the above expenditure is for motive power, and that if the industry were to be combined with that of the tea and coffee plantation or the indigo factory, waste lands in the vicinity would become productive, and periods when

the factory is now silent would be fully and profitably occupied. A correspondent from Colombo in the *Tropical Agriculturist for 1882-83, p. 429,* strongly urges this view, and he calculates that a "gratteuse" or fibre-extracting machine could easily be constructed for R200 and worked by any available motive power. The subject seems well worthy of the attention of our planters.

In the spring of 1882, what appears an excellent machine for the separation of this fibre was patented in the United States and favourably noticed and illustrated in the *Scientific American.* It is exceedingly probable, however, that the Ekman or some other chemical process of extraction of the fibre will supersede completely the mechanical. The *Planters' Gazette* very justly remarks that a fibre would then be obtained fine enough for spinning and weaving purposes, the market value of which would be three or four times as much as that obtained for the coarse fibre extracted by mechanical contrivances. In India there should be no difficulty in introducing the Ekman process, since bi-sulphate of magnesia is easily and cheaply procurable. The Aloe fibre succeeds best where few, if any, trees will grow; the chemical process removes the difficulty regarding the fuel supply.

Two samples of Agave fibre from Mauritius were exhibited at the late Calcutta International Exhibition,—the one in the Mauritius Court, prepared by the usual process practised in that island; the other in the New South Wales Court, prepared by a patent process invented by **M. G. A. Lusignan** of Sydney.

ROPE.

In India, the Agave, as a fibre-producer, has attracted attention from time to time since 1798. In that year a **Mr. W. Webb,** who had a plantation of it near Madras, made ropes from it. He submitted a coil of this rope to the Military Board of Fort St. George, with a suggestion that he should be allowed to supply it in lieu of rope made in Europe. **Captain P. Malcolm,** of His Majesty's ship *Suffolk,* after trying it, reported it to be as strong as, if not stronger than, coir, and as having the advantage of pliability. A committee of the Military Board, after a trial with it, were of opinion that it was at least equal in point of strength to the best European rope of the same size. "As regards durability, it was mentioned that part of a coil which had been fixed to the anchor of a boat and kept constantly under water for six months, appeared to have undergone no other alteration than European rope would have done in the same situation."

At the beginning of the present century **Dr. Buchanan** found the villagers in Mysore employing the Agave for making strong hedges, and separating the fibre for cordage.

Agave Ropes. 611

In 1841, rope was made at the Alipore Jail (Calcutta) from Agave plants grown there by the convalescent insane. The rope was tested and gave the following results, as compared with other ropes :—

Agave rope broke with	2,519½
Coir rope (same dimensions)	2,175
Jute " " "	2,456¼
Country hemp (sunn)	2,269¼

In 1851, a varied assortment of string, cord, rope, and fibre, undyed and dyed,—orange, red, maroon, and green, as also paper made from the fibre,—was prepared at the suggestion of **Dr. Hunter** of Madras in his School of Arts, and by the prisoners in the jail at Madras. The assortment was shown and admired at the London International Exhibition of that year. There existed at the time a small export trade in Agave fibre from the Madras Presidency to the United Kingdom, Bombay, Cutch, Gujarát,

Sind, and Bengal. The value of this trade was in the official year 1852-53 put down as R27,095 and in 1853-54 R21,506. The quantity exported continued to decline, until the trade practically died out. It may be mentioned, however, that this was in all probability mainly due to the rapid growth of the jute trade, which, at this period, began to develope into a large and important industry.

In 1852, **Dr. G. Tranter,** Surgeon in charge of the United Malwa Contingent (Central India), forwarded to the Agri-Horticultural Society of India some specimens of the fibre which he had extracted from Agave grown in Malwa, where it is plentiful; the specimens were reported to be quite equal in strength to the best Russian hemp.

Dr. Wight gives the following as the results of his experiments with the chief fibres in the Madras Presidency :—

	lbs.
Coir	224
Hibiscus Cannabinus	290
Sansevieria zeylanica	316
Gossypium herbaceum	346
Agave americana	362
Crotalaria juncea	407
Calotropis gigantea	552
The breaking strain of a rope is said to be 270 to 360 pounds as against Russian hemp at	160

All this was shown and urged by **Dr. Royle** nearly 30 years ago; but as far as India is concerned, no progress has been made, except that the plant has spread and taken a firm hold of immense scattered tracts. In concluding his notice of this fibre, **Dr. Royle** urges, what we cannot do better than repeat, that it is very desirable that experiments should be made with the view of discovering the climate best suited for the production of the strongest fibre, the age at which the leaves should be cut, how long they should be macerated, if at all, and the commercial value of the fibres yielded by the various species of **Agave** and **Fourcroya.** *Spons' Encyclopædia* contains an interesting account of the preparation of this fibre by mechanical means. The writer urges that, where cheap labour can be had, the hand-prepared fibres are preferable—an important consideration for India. He further states that the leaves should be cut before the flower appears, and that in fact they cannot be too young, as the older the leaf, the coarser the fibre. (Compare with **Dr. Cobb's** opinion based on his Hazáribágh experiments.)

FABRICS.

Agave Fabrics. 612

At the Calcutta International Exhibition, 1883-84, some excellent samples of Agave fibre were exhibited from Mysore in Madras and from Hazáribágh in Bengal. In the latter case large bundles of both dyed and undyed fibre were exhibited in the Economic Court, as also samples of small carpets woven from the fibre. So early as 1839, however, carpets are reported to have been experimentally made in Balasore (Bengal). Mention is also made of *sataranjis* (carpets) being made in the Bulundshar district, North-West Provinces, and in 1882 the Revenue and Agriculture Department received a sample of matting made of this fibre at Hoshiarpur in the Panjáb; but the preparation of Aloe fibre must be regarded as in an experimental condition only, as far as India is concerned. The chief difficulties are the want of a collective supply (the plant being scattered along roadsides and not cultivated as a crop) and a cheap and convenient appliance for the extraction of the fibre.

§ "The plant requires three years to come to perfection. In Mexico

5,000 to 6,000 plants go to an acre, the average number of leaves being 40, and yielding 6 to 10 per cent. of fibre. The leaves should be cut before they are over-ripe. It is better to cut them too soon than too late, as over-ripe leaves yield a coarse fibre of inferior colour. In Mexico the natives prepare the fibre in the following manner. The cut leaves are steeped in water, then beaten and scraped to remove non-fibrous portions, washed and bleached in the sun. Another plan is to deprive the leaves of about 6 inches of the pointed end, and after having been well beaten, they are tied in bundles, laid in heaps, and allowed to ferment. After the beating the bundles are macerated in water for 14 days, and then finally washed and dried. The process of retting having proved injurious to the fibres of all endogens, mechanical contrivances are now used for separating fibres from the leaves of the Agave, &c. The length of the fibre varies from 3 to 7 feet, and the commercial article is white to straw-white. The breaking strain of a rope has been stated at 270 lb. to 362 lb. as against Russian hemp at 160 lb. In its native countries the fibre is used in the manufacture of ropes, hammocks, twine, &c. The short fibres have been carded and spun, while the waste is an excellent material for the manufacture of coarse paper. Slips of paper weighing 39 grains bore an average weight of 89 lb. as against Bank of England pulp 47 lb. (*Spons' Encycl.*). As the plant is exceedingly hardy, very prolific, and will grow in arid wastes, where scarcely any other plant can live, it might perhaps be advantageous to plant with Agave those districts in India in which the soil proves unfertile from the presence of alkaline salts, &c. The experiment would not be costly, and might give good results. **Bousingault** found the juice to contain over 6 per cent. of cane-sugar. The fermented juice, *pulque*, contained 35·4 grains of alcohol per litre." (*Surgeon C. J. H. Warden, Professor of Chemistry, Medical College, Calcutta.*)

AS A PAPER MATERIAL.

PAPER. 613

In India scarcely any Agave fibre is used in the manufacture of paper.

In October 1877 the Revenue and Agriculture Department of the Government of India issued a Resolution, requesting Provincial Governments to consider the utilization of the Agave fibre, and especially directed the attention of the Government of Bombay to the advisability of making an experiment with it, adding that there was a prospect of utilising large quantities of a material now almost altogether wasted. An experiment was accordingly made at the Girgaum Paper Mill, and, under the instructions of the Bombay Government, 300 maunds of leaves were, on 30th July, furnished by the Collector of Thána. The manager of the mill could not, however, conveniently use them, and they lay in a heap until the middle of August, when, without having been previously prepared, they were put into the steam-machine to be worked up direct into paper. The result was of course a failure. **INDIAN EXPERIMENTS.**

In Bengal, at the Central Jail, Hazáribágh, an experiment was also undertaken. An area of 300 acres of waste land was put under Agave in 1878-79 to furnish stock to be experimented with at the jail paper-mill. Samples of this fibre were also supplied to the Bally Paper-Mills (Calcutta), where it was discovered that one of the greatest difficulties in the way of Agave fibre for paper manufacture was the fact that the young leaves yielded too fine a pulp. The best leaves were those three years old. A mixture was proved to be injurious, and therefore a difficulty exists in the necessity of getting leaves uniformly of the same age, and if possible leaves three years old.

For paper manufacture this fibre seems likely, however, to command a good market. " It is the most highly approved of all the paper fibres,

making a strong, tough, smooth paper which feels like oiled paper, and, even while unsized, may be written upon, without the ink running." "Its price is governed by that of Manilla hemp, being generally £7 to £10 a ton less than the latter." "The fibre prepared in India is harsh and brittle, though of good colour; it is not met with in commerce." (*Spons' Encyclop.*) The character of the Indian-prepared fibre is chiefly due to the mode of its extraction.

SOAP. 614

SOAP SUBSTITUTE.

The juice is made into soap. For this purpose it is expressed and the watery part evaporated either by artificial heat or by simple exposure to the sun. On its reaching a thick consistence it is made up into balls along with lye-ash. This soap lathers with salt as well as with fresh water. A gallon of the sap yields about a pound of the soft extract. (*Treasury of Botany; U. S. Dispens., Ed. 15th; &c., &c.*)

MEDICINAL PROPERTIES OF AGAVE.

MEDICINE. The Leaves. 615 Roots. 616 Decoction. 617 Sap. 618 Leaves as a poultice. 619 Fresh juice. 620 Gum. 621

Medicine.—The leaves, as also the ROOT when cut, yield a saccharine juice which by evaporation may be converted into a syrup having a peculiar nauseous odour and acid taste; it reddens litmus paper. This is administered by American doctors, having attributed to it resolvent and alterative properties; it is regarded as specially useful in syphilis. **Dr. Ross** (*Pharm. Ind., 235*) is said to have employed the roots in secondary syphilis with great apparent benefit, in the form of a decoction, in the proportion of four ounces to one pint of water. The SAP is stated to be laxative, diuretic and emmenagogue, and in doses of two fluid ounces, three times a day, has been found very useful in scurvy. (*U. S. Dispens.*) General Sheridan is reported to have used the juice with great success amongst his men who were suffering from scurvy, in a small isolated post on the Texas border. The disagreeable smell of the juice, which has been compared to that of putrid meat, causes a person at first to turn from it in disgust, but after a while the odour is overcome, and a liking for it takes the place of the previous dislike (*Year-Book, Pharm., 1875, 232*). The large, moist, fleshy LEAVES are stated to have been used with much advantage as a poultice; the fresh juice is applied to bruises and contusions. The GUM found exuding from the leaves and lower part of the stem is used in Mexico as a cure for toothache.

§ "The pulp of the leaves placed between folds of muslin is applied to the eye in conjunctivitis; it is also used, mixed with sugar, in gonorrhœa twice a day, the dose being ℥ii (by weight). (*Hony. Surgeon P. Kinsley, Chicacole, Ganjam District, Madras.*) "Not used medicinally, I think, in South India; it is cultivated as a hedge, and for making fibre." (*Deputy Surgeon-General G. Bidie, C.I.E., Madras.*)

Roots. 622

"The roots are diuretic. (*Lindley.*)" (*Dr. H. W. Hill, Mánbhúm.*) "Used by the natives in chronic gonorrhœa." (*Surgeon-Major J. M. Zorab, Balasore.*)

DOMESTIC USES.

DOMESTIC. Razor-strops. 623 A cork substitute. 624 Roofing. 625 Fuel. 626

The dry flowering stem is cut up into useful razor-strops and used as a substitute for cork. "The leaves and stems are employed in roofing; the decayed leaves are also used as fuel when firewood is scarce; the terminal spines serve as pins and nails." (*Cleghorn.*) Wall plaster, impregnated with the expressed juice, is said to be proof against the ravages of white-ants. Sugar, vinegar, and a kind of beer and brandy are made from the sap.

Spines. 627 Wall plaster. 628

Agave angustifolia is cultivated as a source of fibre, but is not distinguished by the planter from **A. americana.** 629

A. saponaria is a powerful detergent; its roots are used as a substitute for soap. (*Lindley's Vegetable Kingdom, 1847, pp. 157, 158.*) Compare with remarks given under **A. americana** as to the detergent properties of the sap of that species. 630

A. sisalana.

THE HENEQUEN FIBRE OF SISAL HEMP OF AMERICA.

This fibre is rapidly gaining favour. It is said to be prepared without maceration. The leaf is laid upon a board and scraped with a wooden fork till all the pulp has been removed. The fibre is then bleached and dried in the sun. It is more easily dyed than any other fibre of this class, and is thus very useful for making fancy articles of different kinds. At the same time *Henequen* is now made into sacks and used in the grain trade. The following extract from *Christy's New Commercial Plants* will be found interesting as showing the progress made in the Sisal Hemp industry:— FIBRE. Leaves. 631 Sacking. 632 Fancy articles. 633

"In Yucatan the two varieties of the fibre are distinguished as the *Yashqui henequen*, which produces the best quality, and the *Sacqui henequen*, which gives the greatest quantity. It is worked by machinery, and from July 1875 to June 1876, Yucatan produced 22,000,000 lbs. of Henequen fibre, 18,000,000 lbs. of which were sent to British ports. The remainder was sent to Cuba and Mexico. I am unable to give the figures as to the American importation in late years, but the amount must be considerable, as the fibre is now in high favour as a cordage material, manufacturers claiming that it has been growing better and better each year in quality. A few figures are given in the latter part of the flax and hemp report under the heading 'Other Fibres,' which will give some idea of the amount consumed at present in this country. A recent report, published in Yucatan, gives the following figures: Taking 1¼ lbs. of fibre for the yearly production of each Henequen plant, we come to the conclusion that at present there are more than 18,000,000 plants under cultivation. For this number of plants over 420 scraping-wheels are in operation, moved by 229 steam-engines, with a force of 1,732 horse-power, and 30 wheels moved by animal power. Each scraping-wheel cleans daily, on an average, 300 lbs. of fibre; so the 450 wheels in existence do not work at present 163 days in the year. Yashqui fibre. 634 Sacqui fibre. 635

"It is estimated that in Yucatan alone a capital of over $5,000,000 is vested in this industry.

"A peculiarity of this fibre is that it resists the action of dampness for a greater length of time than hemp or similar fibres, which makes it very desirable in the manufacture of cable-ropes, &c., used in the rigging of ships."

CULTIVATION AND YIELD OF FIBRE.—As cultivated in Mexico, an acre generally contains 5,000 to 6,000 plants. A dry, stony soil is selected for its cultivation. Young plants, 2 to 3 feet high, are planted out 12 feet apart, and weeded twice a year. The yield commences by the lower leaves being cut off about the fifth year, and this is continued annually for ten years or more. Of the shoots that spring up at the 8th, 10th, or 12th year, one is left to replace the parent plant, which is then destroyed, and the other daughter off-shoots are transplanted. The annual yield of fibre is about a ton an acre.

A. vivipara, *L.* 636

THE BASTARD ALOE.

Syn.—AGAVE CANTALA, *Roxb.* This may prove but a variety of **A. americana.**

Vern.—*Khetki, háthi chingár*, OUDH; *Kathalai*, TAM.; *Petha-kalabantha erikatali* (BELLARY), TEL.; *Kantala*, SANS.

Habitat.—Commoner in upper than in lower India, specially in the North-West Provinces; almost unknown in Bengal.

Botanic Diagnosis.—Some authors seem to think this should not be regarded as a variety of **A. americana**, but rather as a distinct species, differing, as it does, chiefly in the fact that it raises its cluster of leaves upon a short, erect stem, which produces viviparous buds. It is altogether a much less robust plant. The leaves are less fleshy and erect instead of reflexed. The flowering stem is not more than half the height of that of **A. americana**, and much thinner and red-coloured. When seen growing side by side they appear quite distinct.

Stewart identified this plant with **Roxburgh's A. Cantala**, and seemed to think it was indigenous to India. There is little doubt, however, that all the members of this group have been imported from America, and even **Roxburgh**, with the imperfect botanical literature at his disposal, arrived at the conclusion that the plant had been introduced by Europeans, from the name *bélati ánanásh* (European Pine Apple) applied to the species of Agave. **Royle** observed that on a rich soil this species becomes viviparous, while on a poor stony soil and under a dry climate, seeds alone are produced.

FIBRE. 637 **Fibre.**—The *Oudh Gazetteer* says it is chiefly grown as a hedge to keep back cattle, but in the jails good fibre is prepared from its leaves.

MEDICINE. 638 **Medicine.**—§ "The juice, along with the flower of **Eleusine coracana**, is applied to contusions of draught-cattle." (*Surgeon-Major W. Dymock, Bombay.*)

Agave Soap, see **A. saponaria** and **A. americana.**

Agila-wood, see **Aquilaria Agallocha**, *Roxb.*

639 **AGLAIA**, *Lour.; Gen. Pl., I., 334.*

A genus of trees or shrubs, glabrous, lepidote or stellately pubescent (belonging to the Natural Order MELIACEÆ and the Tribe TRICHILIEÆ), comprising some 50 species; inhabitants of China, India, the Malaya, and the Islands of the Pacific.

Leaves pinnate or trifoliolate, *leaflets* quite entire. *Flowers* polygamo-diœcious small, globose or turbinate (not oblong linear), numerous, paniculate. *Calyx* and *corolla* each 5-lobed. *Stamens* united into an urceolate tube; *anthers* 5, included or sub-exserted, erect. *Disk* small. *Ovary* 1-3-celled, with 2-1 ovules in each cell; *style* very short. *Berry* dry, 1-2-celled and seeded.

This genus is now made to include Nemedra, *Juss.*, and Milnea, *Roxb.*; the former used to be referred to Amoora, and the latter retained as a distinct genus. (See *Appendix to Gen. Pl., I.*) **Aglaia**, a Gr. proper name, Αγλαία, derived from ἀγλαία, beauty, splendour—the youngest of the Three Graces.

A species collected by **Kurz** in the Andaman Islands, **A. ? andamanica**, *Hiern*, is called in Burmese *Tau-ahnyeen.*

640 **Aglaia edulis**, *A. Gray; Fl. Br. Ind., I., 556.*

Vern.—*Late mahwa*, NEPAL; *Sinakadang*, LEPCHA; *Gumi*, GÁRO HILLS and SYLHET.

Habitat.—A middling-sized tree of Eastern Bengal, as also the Gáro Hills and Sylhet, flowering in June-July; fruit ripening two or three months later.

Botanic Diagnosis.—Shoots, leaves, and inflorescence with ferruginous scales, mixed with stellate hairs, leaflets 9-13, opposite or sub-opposite. Flowers shortly pedicelled, arranged in pyramidal panicles shorter than the leaves.

Properties and Uses—

Food.—Fruit eaten by the natives. **Roxburgh** says the natives of the Gáro Hills and Sylhet "eat the large succulent aril which surrounds the seed under the cortex of the berry." FOOD. Fruit. 641

Aglaia minutiflora, *Bedd.; Fl. Br. Ind., I., 557.* 642

Habitat.—A handsome tree, 25 to 40 feet in height, with exceedingly hard wood, was collected in Courtallum by **Voigt**, and by **Beddome** at Travancore, altitude 2,500 feet. **Griffith** and **Maingay** found it in Tenasserim and Malacca.

Botanic Diagnosis.—*Leaflets* 7-15, pubescence ferruginous or rufous stellate, narrowly elliptic, acuminate. *Panicles* divaricately branched, many-flowered, half to as long as the leaves. *Fruit* sub-globose 1-2-seeded, $\frac{3}{4}$ to 1 by $\frac{1}{2}$-$\frac{3}{4}$ inch.

A. odorata, *Lour.; Fl. Br. Ind., I., 554; Wight, Ic., t. 511.* 643

Habitat.—An elegant shrub or small tree, met with in the Eastern Peninsula, often cultivated in gardens on account of its sweetly-scented flowers.

Botanic Diagnosis.—Extremities of the young shoots covered with stellate hairs, rapidly becoming glabrous. *Leaflets* 3-5, rarely 7, obtuse. *Panicles* lax-flowered; *ovary* hairy.

A. Roxburghiana, *Miq.; Fl. Br. Ind., I., 555; Wight, Ic., t. 166.* 644

Vern.—*Priyangu*, BENG., HIND., and SANS.

Habitat.—A large tree of the Western Peninsula; from the Konkan and Midnapore southwards; Ceylon, ascending to 6,000 feet; Singapore. *Distrib.*—Java, Sumatra, and other Malay Islands.

Botanic Diagnosis.—*Leaflets* 5, rarely 7 or 3, ellipti-cobtuse, glabrescent. *Panicles* dense-flowered, somewhat supra-axillary, pyramidal elongate; *flowers* on very short pedicels, $\frac{1}{12}$ in. diameter. *Calyx* yellow, often covered with stellate hairs. *Fruit* $\frac{3}{4}$ in. diameter, buff coloured, minutely pilose.

Properties and Uses—

Food.—Fruit said to be edible. FOOD. Fruit. 645

Medicine.—§" Is regarded by Sanskrit writers to be cooling and useful in burning of the body and painful micturition. The fruits are described as sweet, astringent, and tonic." (*U. C. Dutt, Civil Medical Officer, Serampore.*) MEDICINE. Fruit. 646

AGRICULTURAL IMPLEMENTS AND MACHINERY, Timbers used for. TIMBER. 647

Acacia arabica
A. Catechu.
A. ferruginea.
A. melanoxylon,
A. modesta.
A. planifrons.
Acer oblongum.
A. pictum (ploughs).
Adina cordifolia.
Ægle Marmelos.
Albizzia amara (ploughs).
A. procera.
Anogeissus pendula.
Bauhinia purpurea.
B. variegata.
Berrya Ammonilla.
Briedelia retusa (agricultural implements and cattle-yokes).
Buchanania latifolia (cattle-yokes).
Calophyllum inophyllum (machinery).
Capparis aphylla.
Caryota urens.
Cassia Fistula.
C. siamea (mallets).

Agricultural Implements and Machinery, Timbers used for—(continued.)

Castanopsis rufescens.
Chloroxylon Swietenia (ploughs).
Cordia Myxa.
C. Rothii.
Cratoxylon neriifolium.
Dalbergia cultrata.
D. latifolia.
D. Sissoo.
Daphnidium pulcherrimum (cattle-yokes).
Dolichandrone falcata.
Ehretia lævis.
Eugenia Jambolana.
E. operculata.
Feronia Elephantum.
Flacourtia Ramontchi.
Fraxinus floribunda (ploughs).
Hardwckia binata (machinery).
Heritiera Papilio.
Hymenodictyon excelsum.
Kydia calycina (ploughs).
Lagerstrœmia parviflora.
Melia Azadirachta.
Miliusa velutina.
Milletia pendula (harrows).
Morus serrata.
Murraya Konigii.
Odina Wodier (cattle-yokes).
Olea ferruginea.
Ougeinia dalbergioides.
Phyllanthus Emblica.
Pinus excelsa (spades).
Plectronia didyma.
Prosopis spicigera.
Pterocarpus Marsupium.
Quercus dilatata.
Q. fenestrata.
Q. Ilex.
Q. incana (ploughs).
Q. semecarpifolia (ploughs).
Randia dumetorum.
Salvadora oleoides.
Schleichera trijuga.
Securinega obovata.
Shorea robusta (Santal ploughs).
Soymida febrifuga (ploughs).
Stephegyne parvifolia.
Strychnos Nux-vomica.
S. potatorum.
Tamarix articulata (ploughs).
Tecoma undulata.
Tectona grandis.
Terminalia Arjuna.
T. belerica (ploughs).
T. Chebula.
T. paniculata (ploughs).
Tetranthera monopetala.
Trewia nudiflora.
Wendlandia exserta.
Xylia dolabriformis.
Zizyphus Jujuba.
Z. xylopyra.

648 AGRIMONIA, *Linn.; Gen. Pl., I., 622.*

A small genus of herbs (belonging to the Natural Order ROSACEÆ), containing in all some 8 species, 3 of which are met with in India.

Leaves interruptedly pinnate; *stipules* slightly adnate. *Flowers* small, yellow, in terminal spike-like racemes, 2 bracteolate; pedicels bracteate at the base. *Calyx* persistent; *tube* turbinate-spinous; *mouth* contracted; *lobes* 5, triangular, imbricate. *Petals* 5. *Stamens* 5-10 or more, inserted at the mouth of the calyx. *Disk* lining the calyx-tube, its margin thickened. *Carpels* 2, included in the calyx tube; *styles* exserted; *stigmas* 2-lobed; *ovule* 1, pendulous. *Fruit* enclosed within the hardened spinous calyx.

649 **Agrimonia Eupatorium,** *Linn.; Fl. Br. Ind., II., 361.*

Habitat.—An herb of the temperate regions, frequenting hedgerows and thickets. It is common in England, America, and India; in the latter all along the Himálaya from Kashmír to Sikkim, altitude 3,000 to 10,000 feet, and to the Khásia, Naga, and Mishmi hills.

MEDICINE. **Medicine.**—From the remotest times Agrimony has enjoyed a high reputation amongst the herbalists of Europe; it is strange that it should

be apparently quite unknown to the native doctors of India. The root is a powerful astringent, a useful tonic, and a mild febrifuge. The whole plant also yields a dye, which seems to be unknown to the hill-people of India. Root. 650 DYE. 651

Agrimony Hemp, see **Eupatorium cannabinum,** *Linn.*; COMPOSITÆ.

AGROSTIS, *Linn.*; *Gen. Pl., III.*, 1149. 652

A genus of grasses, the type of the Tribe AGROSTIDEÆ (Natural Order GRAMINEÆ), comprising about 100 species, distributed through the colder temperate regions.

Creeping annual or perennial grasses. *Panicle* loose, *spikelets laterally compressed, 1-flowered. Glumes* membranous-acute, unarmed, *the upper being smaller* than the lower. *Flower with hairs at its base* and no rudiment. *Pales* unequal, scarious; dorsal awn falling short of the glumes, or wanting. *Stamens* generally 3. *Style* short, distinct; *stigma* feathered. **A. canina,** *Linn.*, does not possess the inner pale.

Mr. Duthie enumerates, amongst others, the following species as met with in the N.-W. Provinces. Very little is known regarding the economic uses of the Indian members of this genus.

Agrostis alba, *Linn.; Duthie's Grasses, 29.* 653

FIORIN or WHITE BENT GRASS.

Syn.—A. STOLONIFERA, *Savi*; A. SYLVATICA, *Host.*

Habitat.—Northern India, and ascending the Himálaya up to 13,000 feet. Grows in all kinds of soils; delights in one that is rich and moist. In Europe it frequents fields and the sands on the sea-shore.

Botanic Diagnosis.—*Stem* procumbent, creeping, often with long stoles; *sheath* rough; *ligula* long, acute. *Panicle*-spreading in flower, afterwards becoming close. *Pedicels* very much toothed. *Florets* rarely awned; *glumes* nearly equal, lower toothed through its keel.

Fodder.—A most valuable fodder grass. FODDER. 654

A. canina, *Linn.; Duthie's Grasses, 29.* 655

Syn.—A. RUBRA, *Linn.*; AGRANLUS CANINUS, *Beauv.*; TRICHODIUM CANINUM, *Schrad.*

Habitat.—Western Thibet, altitude 12,000 feet; in Europe common on heaths.

Botanic Diagnosis.—*Branches* and *pedicels* rough; *sheath* smooth; *ligule* oblong acute. *Glumes* unequal, acute, lower pale, jagged, at the top 4-ribbed, kneed and twisted, awn from below the middle of and exceeding the pale, lower setaceous and tufted.

A. ciliata *Trin.; Duthie's Grasses, 29.* 656

Syn.—LACHNAGROSTIS CILIATA, *Nees.*

Habitat.—North-West Himálaya from 8,000 to 15,000 feet.

A. diandra, *Linn.; Roxb., Fl. Ind., Ed. C.B.C., 106.*

THE *bena joni,* BENG. Syn. for **Sporobolus diander,** *Beauv.*, which see.

A. maxima, *Roxb.; Fl. Ind., Ed. C.B.C., 107.* Syn. for **Thysanolæna acarifera,** *Nees,* which see.

A. tenacissima, *Linn.; Roxb., Fl. Ind., Ed. C.B.C., 106.* Syn. for **Sporobolus tenacissimus,** *Beauv.*, which see.

Agar-wood, ee **Aquilaria Agallocha,** *Roxb.*

657 **AILANTHUS,** *Desf.; Gen. Pl., I., 309.*

A small genus of lofty trees (belonging to the Natural Order SIMARUBEÆ), comprising 3-4 species, of which two are met with in India.

Leaves very large, unequally pinnate. *Flowers* small, polygamous, in terminal or axillary panicles. *Calyx* 5-fid; *lobes* equal, imbricate. *Petals* 5, valvate. *Disk* 10-lobed. *Stamens* 10 (in the hermaphrodite flowers 2-3). *Ovary* 2-5-partite; *ovules* one in each cell. *Fruit* a one-seeded samara.

The generic name is said to be derived from *Ailanto,* the vernacular name for a species met with in the Moluccas.

658 **Ailanthus excelsa,** *Roxb.; Fl. Br. Ind., I., 518; Wight, Ill., I., t. 67.*

Vern.—*Maha rukha, mahárukha, limbado,* HIND.; *mahánimb,* MAR.; *Mahanim, máhála, gormi-kawat,* URIYA; *Ghorkaram,* PALAMOW; *Moto-aduso,* GUJ.; *Varul, mahárúkh,* DUK.; *Arúa,* N.-W.P. and MEYWAR; *Peru, pee, perumaruttú,* TAM.; *Pedu, pey, pedda, peddámánu putta,* TEL.; *Perumarum,* MAL.; *Mádalá, aralu,* SANS.

Habitat.—A tree about 60 to 80 feet in height, somewhat resembling the ash; probably introduced into India; common in the North-West Provinces, Behar, the Western Peninsula, and the Carnatic. In the Bombay Presidency widely distributed over the Kaira, Panch Mahâls, and Gujarât District; occasionally met with in Râjputana. (*Ráj. Gaz.,* 27.) Common on the Coromandel Coast and in Ceylon.

Botanic Diagnosis.—*Leaves* 1-2 feet long, glandularly hairy; *leaflets* very coarsely toothed. *Stamens* with the filaments about half the length of the anther. *Samara* 2 inches by ½ inch, red, twisted.

GUM. 659 **Gum.**—A red gum, sent from Madras to the Panjáb Exhibition, is said to have been prepared from this plant at Chingleput. It resembles Moringa gum, and consists of large rounded tears of a deep vinous red.

MEDICINE. Bark. 660 **Medicine.**—THE BARK is aromatic and used for dyspeptic complaints; it is also regarded as tonic and febrifuge in cases of debility. Expectorant and antispasmodic, given in chronic bronchitis and asthma (*Bomb. Gaz., VI., p. 15*). The leaves and the bark are used as a medicine (*Bomb. Gaz., VII., 42*). "This bark has a pleasant and somewhat aromatic taste, and is prescribed by the native practitioners in infusion, in dyspeptic complaints, to the extent of three ounces twice daily" (*Ainslie*). **Dr. Dymock** says this description is scarcely correct; the bark is intensely bitter, like quassia. "In Bombay the bark and the leaves are in great repute as a tonic, especially in debility after child-birth. The name *Maharúk* is also applied to a species of cinnamon by the Konkanist gardeners of Bombay." (*Dr. Dymock, Mat. Med., W. Ind., 116.*) The Surgeon-General, Madras, in forwarding, through the local Government to the Supreme Government, certain proposals regarding a future edition of the *Pharmacopœia of India* suggested "that the bitter principle of the bark" of this plant should be made officinal. A powder made from the resin mixed with milk is given in small doses in dysentery and bronchitis.

§ "Used also as an astringent in diarrhœa and dysentery. Natives mix it with curds." (*Surgeon-Major W. D. Stewart, Cuttack.*)

Chemical Composition.—This substance has not been carefully examined, but **Dr. Dymock** informs me that "**Mr. N. Daji** separated an acid principle which he named *Ailantic acid.* It is reddish brown, very bitter, very easily soluble in water, less in alcohol and ether, and insoluble in chloroform and benzol." **Mr. N. Daji** also found a bitter non-crystallizable principle, but he attributes the medicinal virtue to Ailantic acid. "Ailantic acid may be given in doses of 1 to 3 grains, and is said

Ailantic Acid. 661 to be tonic and alterative. In large doses it causes nausea and vomit-

ing, and is purgative. He recommends its use in dyspepsia with constipation. **Mr. Narayan Daji's** paper is of a high class." (*Deputy Surgeon-General G. Bidie, Madras.*)

Structure of the Wood.—Soft, white; similar to that of **A. malabarica.** Weight 28 lbs. per cubic foot. **Dr. Dymock** says that the microscopic structure "of the bark shows large stony cells collected together in groups. There are also many conglomerate raphides." TIMBER. 662

Used to make floats for fishing nets and lines, sword-handles, spear-sheaths, and catamarans. (*Ainslie; Roxburgh.*) The wood is used in making drums and sword-sheaths. (*Bomb. Gaz., VII., p. 42.*)

Ailanthus glandulosa, *Desf.; Fl. Br. Ind., I., 518; Brandis. For. Fl., 58.* 663

Incorrectly called the JAPAN VARNISH TREE, *Eng.;* GÖT-TERBAUM (*Tree of the Gods*), *Ger.;* VERNIS DU JAPAN, *Fr.*

Habitat.—A lofty tree, met with in North India, most probably introduced from Japan. Extensively cultivated on the Continent as an avenue tree along with the tulip-tree, the horse-chestnut, the plane, &c. The leaves are not liable to be attacked by insects, and therefore, until the first frosts of November, the tree remains covered with its large leaves, affording a grateful shade. "It grows rapidly, throwing up abundant root-suckers, and has for that reason been employed in plantations made to clothe barren stony hills in the south of France." (*Gamble.*)

Botanic Diagnosis.—*Leaves* often exceeding 1 foot, pubescent or sub-glabrous; *leaflets* very numerous, coarsely toothed at the base. *Stamens* exserted; *filaments* several times the length of the anthers. *Samara* 1 inch by $\frac{1}{8}$ inch, membranous, linear-oblong.

Sericulture.—Upon the leaves of this tree the wild silk-worm Attacus Cynthia, *Drury,* is reared in Europe, and it is perhaps the most successful tree for the experimental rearing of different species of silk-worms. It grows freely even in England, and the insects thrive upon it. It is anticipated that the rearing of Attacus Cynthia upon this tree may become an established industry in Europe. SERICULTURE. 664

In connection with the subject of the value of **Ailanthus** as a food for silk-worms, it seems highly desirable that experiments be performed in India, with the object of producing a *reelable hybrid-eri* cocoon, which would still preserve the valuable property of feeding upon an annual plant such as the castor-oil. The **Ailanthus glandulosa** has proved a most convenient plant for experimenting with Indian wild insects in Europe, but, both for experiments in India and in Europe (as far as the respective climates will permit), the following plants are those which would most probably afford the means of prosecuting the investigations necessary for the production of hybrids of Indian indigenous silk-worms. The plants have been grouped in a way which brings out the overlappings in habit, as also some of the structural affinities of the more important species of silk-worm.

TEMPERATE PLANTS. 665

* **Actias and Caligula Series.**

1st.—Rosaceous plants such as **Prunus Cerasus** (the wild cherry), **Pyrus communis** (the wild pear), and **Cydonia vulgaris** (the wild quince); small trees met with in India on the Himálaya and the hills of the Eastern Peninsula, at altitudes of from 5,000 to 10,000 feet.

The following species of silk-worms feed upon these plants in their wild state: Actias selene, Caligula simla, C. thibeta.

AILANTHUS glandulosa.

A Classified List of the Plants

2nd.—**Pieris ovalifolia**, an exceedingly plentiful, Ericaceous, small tree, coming into fresh green foliage just before, and flowering during, the rains, on the Himálaya and mountains of the Eastern Peninsula, at altitudes of from 4,000 to 8,000 feet.

The following insects feed upon it : Actias selene, Caligula thibeta.

** **Actias and Attacus Series.**

3rd.—**Ailanthus excelsa** and **A. glandulosa** (the former would most probably not succeed in England).

The following are the insects regularly found feeding on these trees in India : Attacus ricini (*the eri silk-worm*) and A. cynthia.

4th.—**Coriaria nepalensis**, a small leafy bush, belonging to the Natural Order CORIARIEÆ (allied to MORINGEÆ, and LEGUMINOSÆ), plentiful on the Himálaya and mountains of the Eastern Peninsula, Burma, and the Straits ; altitude from 5,000 to 10,000 feet. Should grow freely in England. This is one of the most curious plants enumerated in this list, and for the purpose of rearing hybrids seems the most hopeful.

The following insects feed upon it in their wild state : Actias selene, Attacus canningi, and A. ricini.

666 WARM TEMPERATE PLANTS.

*** **Attacus, Antheræa, and Cricula, or the Eri, Munga, Cricula. and Tusser Series.**

5th.—**Symplocos cratægoides, S. grandiflora,** and **S. ramosissima,** Small trees or shrubs on the Himálaya and lower hills of India, ascending to 7,000 feet in altitude.

The following insects are known to feed upon these plants, or are actually fed upon them, in their semi-domesticated condition : Attacus atlas, A. ricini (*small red form of Eri*), and Antheræa assama (*the Munga silk-worm*).

6th.—**Ricinus communis** (the common castor-oil plant), cultivated in the plains of India and on the hills up to an altitude of 7,000 to 8,000 feet. Grown as an annual in England, ornamental forms having been produced by the gardeners.

The following are the insects which feed on this plant: Attacus ricini (*the Eri silk-worm*). This is its principal food in domestication and also in its wild state. A. cynthia and Antheræa myletta (*the Tusser silk-worm*).

7th.—Species of Laurels, in India chiefly **Machilus odoratissima** (up to altitude 8,000 feet, the principal food of the *Munga*) and **Tetranthera polyantha.**

The following are the insects which feed on these plants, as also on one or two allied species of laurels : Antheræa assama (*the Munga silk*) and Cricula trifenestrata (the common wild, yellow, reticulated cocoon of Burma and of the South and West of India). Upon the former tree these insects chiefly feed, both in their wild and semi-domesticated conditions.

667 TROPICAL PLANTS.

It is necessary to add to the experimental plantation one or two other trees with the view of admitting of a more thorough investigation of the forms and possible hybridisation of the *Tusser silk-worm.*

**** **The Tusser Series.**

8th.—**Zizyphus Jujuba.**

9th.—**Lagerstrœmia indica.**

Two small trees or bushes which experience has shown to be perhaps upon the whole the best plants for the cultivation of the tusser worm.

10th.—**Terminalia tomentosa** and one or two allied species (the myrobolan or wild almond family). These are the trees which the *tusser* worm seems to prefer most in its wild condition.

In the above brief indication of the food materials of certain silk-worms, only the more important species or the genera most likely to afford useful hybrids have been mentioned.

It is interesting to observe that this climato-botanical classification brings the indigenous silk-worms of India into groups closely corresponding to those formed upon a more scientific principle. It would almost seem that hybridisation to be successful must pass through these natural affinities. It is remarkable that none of the Indian SATURNIDÆ (the family to which the foregoing silk-worms belong) show the slightest tendency to feed on the plants upon which the mulberry silk-worms (the BOMBYCIDÆ) are reared,—a fact which gives some weight to the idea that the latter are not truly indigenous to India. (*For further information consult the account given under "Silk."*)

MEDICINAL PROPERTIES AND USES.

According to **Prof. Hetet** the bark of **Ailanthus glandulosa** is an active vermifuge; in powder it has a strong, narcotic, nauseating odour. It exercises a powerful depressing influence on the nervous system similar to that of tobacco. Various preparations of the bark administered by **Prof. Hetet** to dogs had a purgative effect with the discharge of worms. The powdered bark has been given in one or two cases of tape-worm in the human subject and proved remarkably successful in expelling the worm and at the same time operating on the bowels. **MEDICINE. The Bark. 668**

It was found that the depressing effects on the nervous system were due to the presence of the volatile oil, the resin having no such influence. The oleo-resin produces the same effects as the powdered bark and has the advantage that it keeps better. The dose of the powdered bark, sufficient for the expulsion of tape-worm, was found to be from 8 to 30 grains, the oleo-resin somewhat smaller. (*U. S. Dispens., 15th Ed., 1564.*)

Structure of the Wood.—"Extremely durable, pale yellow, of silvery lustre when planed, and therefore valued for joiners' work; it is tougher than oak or elm, easily worked, and not liable to split or warp." (*Baron F. Von Mueller.*) **TIMBER 669**

It grows exceedingly rapidly, sending out numerous suckers from the roots, and as it is not particular about soil, it is admirably suited for the reclamation of waste lands. **Professor Meehan** states that it interposes the spread of the rose-bug, to which the tree is destructive. (*Extra-Trop. Plants, Baron F. Von Mueller.*)

Ailanthus malabarica, *DC.; Fl. Br. Ind., I., 518; Wight, Ic., t. 1604.* **670**

Vern.—*Peru, peru-marattup-pattai, maddi-pál,* TAM.; *Perumarum, pedda-mánu-patta, maddi-pálu,* TEL.; *Peru-marat-toli, mattip-pál,* MAL.; *Guggula-dhúp, ud,* MAR.; *Dhúp, baga-dhúp, gogul-dhúp,* KAN.; *Manda-dúpa,* HASSAN; *Máttipal,* ANAMALAIS; No Burmese name; *Kambalu, walbiling, koombaloo-gass, wal-biling-gass,* CINGH.

Habitat.—A large, deciduous tree, of the evergreen tropical forests abundant in the Western Ghâts; rare in Pegu, but met with on the

eastern slopes, and in the valley of the Tsit-toung. Often planted in South India for ornamental purposes.

Botanic Diagnosis.—*Leaves* very large; *leaflets* distant, almost entire, nearly glabrous. *Stamens* exserted, upon filaments many times longer than the anthers. *Samara* large, rounded at both ends, not twisted.

RESIN. 671 **Resin.**—On incision the bark yields a dark-coloured soft resin known as *Mattipál*, which, in time, hardens into a brittle resin with a strong balsamic odour.

§ "Exudes a reddish gum." (*J. E. Hardinge, Rangoon*).

Mr. Broughton, Quinologist to Government of Madras, reported upon the resin as follows : "This resin, as commonly met with, is dark brown or grey in colour, is plastic, opaque, and has an agreeable smell. It contains much impurity. The pure resin is very soft, having the consistence of thick treacle; and this is doubtless the reason why it is always mixed with fragments of wood and earth, which make it more easy to handle. The sample which I examined contained but 77 per cent. of resin, the remainder being adulterations. Alcohol readily dissolves the resin, and on evaporation leaves it as a very viscous, transparent, light-brown semi-liquid, which does not solidify by many days' exposure to a steam heat; when burned it gives out a fragrance, and hence it is sometimes used for incense. Its perfume is, however, inferior to that produced by many other resins employed in the concoction of the incense employed in Christian and heathen worship. The peculiar consistency of the resin would enable it to substitute Venice turpentine for many purposes, though its price (R6 for 25 lbs. in the crude state) forbids an extensive employment." "Resin burnt as an incense in Hindú temples." (*Bomb. Gaz., XV., Pt. I., 61.*)

MEDICINE. Resin. 672 **Medicine.**—The RESIN called *muti-pál* was first discovered by **Dr. Buchanan.** It is used medicinally, especially in dysentery. "**Dr. Gibson** regards it as a good stimulant in bronchitic affections." (*Pharm. Ind., 50.*)

Fruit. 673 The FRUIT is considered useful in cases of ophthalmia. (*Aitchison, Kuram Valley Plants, in Jour. Linn. Soc.*) "The fruit, triturated with mango and mixed with rice, is reckoned useful in cases of ophthalmia." (*Surgeon-Major Dymock, Bombay.*)

Bark. 674 The BARK is bitter and given in the treatment of dyspepsia. **Wight** describes this bark as rough and very thick, studded with bright garnet-looking grains, apparently of a resinous nature, which do not dissolve either in spirit or water. "A further knowledge of this bark and its exudation is desirable." (*Pharm. Ind.*)

§ "A valuable substitute for Ipecacuanha in the treatment of dysentery. Fresh juice of bark (1 oz.), with equal quantity of curd, morning and evening, proves highly useful. Commonly used by natives of all classes." (*Surgeon E. W. Savinge, Rajamundry, Godavery, Madras.*) "This tree is very common in the Vizagapatam District. I have frequently used a decoction of the bark in chronic dysentery with the very best effect." (*Hony. Surgeon Easton Alfred Morris, Negapatam.*) "The root-bark, coarsely bruised and kept soaking in gingelly oil, when given internally, is said to be an antidote for cobra-poisoning." (*Surgeon-Major D. R. Thompson, Madras.*)

TIMBER. 675 **Structure of the Wood.**—White, very soft and spongy. Weight 23 lbs. per cubic foot. Useless.

Ajowan, see **Carum copticum,** *Benth.;* UMBELLIFERÆ.

676 AJUGA, *Linn.; Gen. Pl., II., 1222.*

A small genus of herbaceous plants (belonging to the Natural Order LABIATÆ), containing some 30 species. *Corolla* with upper lip very short,

2-lobed, lower 3-lobed and much longer than the upper. *Calyx* ovate, bell-shaped, nearly equally 5-toothed. *Stamens* parallel, protruding beyond the upper lip of the corolla; the lower pair the longest. One of the most marked features of the genus is the prevalence of leaves or bracts in the spike-like inflorescence, causing them to appear more like an ACANTHACEÆ than LABIATÆ.

Ajuga bracteosa, *Wall.; DC. Prod., XII., 589.* 677

Vern.—*Ratpathá,* KUMAON; *Kauri bóti,* JHELUM; *Karkú, nilkantihi,* SUTLEJ; *Khurbanri,* TRANS-INDUS PANJABI NAME.—The bazar names are *Janiadam, mukund babri, nilkantti.* Mr. Baden Powell gives *jan-i-adam* as the vernacular of **Ajuga reptans,** a European species, and **Stewart** further gives that name to **Salvia lanata.**

Habitat.—A small, herbaceous plant, met with on the Himálaya, altitude 2,000 to 3,000 feet, extending from Afghánistan to Nepal.

Medicine.—"*Ján-i-adam* is described as a bitter astringent, nearly inodorous; sometimes substituted for cinchona in the treatment of fevers" (*Baden Powell*). "*Múkand babrí.*—On the Salt Range it is used to kill lice, and is regarded as depurative." (*Stewart.*) "An aromatic tonic, specially useful in ague." (*Baden Powell.*) MEDICINE. 678

There appears to be some confusion as to the identification of the medicinal products sold in the bazars of the Panjáb and North-West Provinces under the names of *Ján-i-adam* and *Múkand babri.* The leaves of the species of **Ajuga** have a peculiar resinous, not disagreeable odour, and a bitter, balsamic taste. They are said to be stimulant, diuretic, and aperient. They have been given in rheumatism, gout, palsy, and amenorrhœa in doses of from 1-2 drachms. (*U. S. Dispens.*)

A. fruticosa, *Roxb.; Fl. Ind., Ed. C.B.C., 458.* Syn. for **Anisomeles malabarica,** *R. Br.*

Akakia.—This is an extract prepared from a species of Acacia,—see **A. arabica.**

Akakiya, a redstone said to be used medicinally. Dr. Irvine, in his *Medical Topography of Ajmere,* mentions this drug, and says it contains iron. It is used as a tonic. 679

ALANGIUM, *Lam.; Gen. Pl., I., 949.* 680

A genus of shrubs or small trees containing only 2 species (belonging to the Natural Order CORNACEÆ). *Leaves* alternate, petioled, entire, 3-nerved at the base, persistent. *Flowers* hermaphrodite, fascicled upon the naked twigs, silky white, jointed on the pedicel: *bracts* absent. *Petals* narrow, much elongated. *Stamens* twice or thrice the petals. *Ovary* inferior, 1-celled, surmounted by a disk; *style* long; *stigma* capitate; *ovule* pendulous. *Fruit* a berry crowned by the disk and the enlarged calyx. *Seed* with crumpled *cotyledons* and ruminated *albumen.*

The generic name appears to be the Tamil name *Alangi* Latinised.

Alangium Lamarckii, *Thwaites; Fl. Br. Ind., II., 741; Wight, Ic., t. 194.* 681

Syn.—A. HEXAPETALUM, *Roxb.; Fl. Ind., Ed. C.B.C., 404;* A. DECAPETALUM, *Lam.* (*Kurz, I., 543*).

Vern.—*Akola, thaila-ankúl, dhera,* HIND.; *Kalá-akolá, ankola,* BOMB.; *Onkla,* GUJ.; *Ankol,* MAR.; *Akar-kanta, bagh-ankurá, dhalákura* (*U. C. Dutt*), BENG.; *Dela,* SANTAL; *Kimri,* MAL. (*S. P.*); *Ankol,* KOL.; *Ankula, dolanku,* URIYA; *Azingki-maram, azhinji, alangi,* TAM.; *Urgu, údugachettu, woodiya-chettoo* (in Godavari Dist.),

kudagu, amkolam-chettu, TEL.; *Ankola, anisaruli, udagina-gida, ansaroli,* KAN.; *Uru, ankola,* GOND; *Ankota,* SANS.; *Epatta,* CINGH.

Habitat.—A deciduous shrub or small tree met with throughout India and Burma in tropical forests.

MEDICINE. Root-bark. 682

Medicine.—The ROOT-BARK is used in native medicine, being regarded as anthelmintic and purgative. It is mentioned by Sanskrit writers as the *Ankota,* and has a reputation in leprosy and skin diseases. **Dr. Moodeen Sheriff**, in his valuable *Supplement to the Pharmacopœia of India,* says: "It has proved itself an efficient and safe emetic in doses of fifty grains; in smaller doses it is nauseant and febrifuge. The bark is very bitter, and its repute in skin diseases is not without foundation." In an official correspondence, forwarded to the Supreme Government regarding the *Pharmacopœia of India,* **Dr. Moodeen Sheriff** says further of this drug: "It possesses the emetic and nauseant properties of ipecacuanha. Is used by natives in cases of leprosy and syphilitic and other skin diseases, and appears to be valuable in this respect." "It is useful in simple continued fever." **Drury** says: "it is also employed in dropsical cases; and pulverised, is a reputed antidote in snake-bites." The Malays believe the fruit to be a hydragogue purgative.

Assistant Surgeon S. Arjun (*Bombay Drugs, p. 70*) states that "the leaves are used as a poultice to relieve rheumatic pains." (*Dymock's Mat. Med., W. Ind., 332.*)

§ "My experience of the root-bark of the white-flowered variety of **Alangium Lamarckii** (**A. decapetalum**) is much greater than before, and I am now able not only to confirm my former opinion as to its efficiency as an emetic in 45 or 50 grain doses, but also to speak of some of its other medicinal properties in more favourable terms. In the early stage of leprosy, psoriasis, secondary syphilis, and some other skin diseases, its benefit is satisfactory if it is used sufficiently long according to the nature of each disease and individual case. It is a good substitute for ipecacuanha and proves useful in all the diseases in which the latter is indicated, except dysentery. As a diaphoretic and antipyretic it has been found useful in relieving pyrexia in many cases of simple, slight, continued, and idiopathic fevers. It is very frequently resorted to as an alexiteric by natives of this country, especially in cases of bites from rabid animals. Powder is the most convenient form of using the root-bark. "*Doses.*—As an emetic, from 45 to 50 grains; as a nauseant, diaphoretic and febrifuge, from 6 to 10 grains; and as an alterative tonic, from 2 to 5 grains." (*Hony. Surgeon Moodeen Sheriff, Madras.*)

"The root is described by Sanskrit writers as heating, pungent, and acrid. It is laxative and useful in worms, colic, inflammations, and poisonous bites. The fruit is said to be cooling, tonic, nutritive, useful in burning of the body, consumption, and in hæmorrhages." (*U. C. Dutt, Civil Medical Officer, Serampore.*)

"There are two or three sorts, with flowers dark, white, and red; the bark of the latter is used as an antidote in snake-poisoning." (*Surgeon-Major J. J. L. Ratton, Salem.*) The root-bark, pulverised and mixed with nutmeg, mace, and cloves, of each grs. 20, is given to check the progress of leprosy; 40 grains of the powder of this bark made into a bolus is given in cases of cobra-poisoning. It is well worth trying in such cases." (*Surgeon Lee, Mangalore.*) The oil of the root-bark is said to be a useful external application in acute rheumatism. No personal experience." (*Surgeon Joseph Parker, M.D., Poona.*)

FOOD. Fruit. 683

Food.—The fruit, a fleshy one-seeded drupe, is eaten, though astringent and acid. (*Bom. Gaz., XV.*)

Structure of the Wood.—Sapwood light yellow; heartwood brown, hard, close and even-grained, tough and strong, easily worked, with a beautiful glossy surface. "The wood is beautiful." (*Roxb.*) **Wight** found it to sustain a weight of 310 lbs. Weight 49 to 56 lbs. According to the *Mysore Gazetteer* the wood is strong and beautiful. TIMBER. 684

It is used as pestles for oil-mills, wooden bells for cattle and other purposes, and is valuable as fuel.

ALBIZZIA, *Duraz.; Gen. Pl., I., 596.* 685

A genus of unarmed trees (belonging to the Natural Order LEGUMINOSÆ and the Sub-Order MIMOSÆ), comprising some 30 species, distributed through the tropics of the Old World.

Leaves bipinnate, often glandular at the base of the petiole, or between certain pinnæ. *Flowers* in globose heads, sessile or pedicellate, usually pentamerous and all hermaphrodite. *Calyx* campanulate or funnel-shaped, distinctly toothed. *Corolla* funnel-shaped; *petals* firmly united below the middle. *Stamens* indefinite, monodelphous at the base (free in Acacia); *filaments* several times the length of the corolla; *anthers* minute, not gland-crested. *Ovary* sessile or only shortly stalked; *stigma* minute. *Pod* large, thin, flat, strap-shaped, straight, sutures not thickened.

The Flora of British India refers the Indian species to two sections:—

* LEAFLETS OBLONG, AT LEAST ¼-½ INCH BROAD.

A. Lebbek, A. pedicellata, A. odoratissima,* A. procera, A. lucida, and **A. glomeriflora.**

* * LEAFLETS NARROW, DIMIDIATE-LANCEOLATE, WITH THE MIDRIB CLOSE TO THE UPPER EDGE.

A. Julibrissin, A. stipulata, A. myriophylla, and **A. amara.**

Albizzia amara, *Boivin.; Fl. Br. Ind., II., 301.* 686

Syn.—A. AMARA and A. WIGHTII, *Grah.* (*Beddome, t. 61, xcvi.*); MIMOSA AMARA and M. PULCHELLA, *Roxb., Fl. Ind., Ed.C.B.C., 418.*

Vern.—*Lulai* or *láli*, MAR.; *Moto sarsio*, GUJ.; *Thuringi, wúnja, suranji, shekram*, TAM.; *Nallarenga, shekrani, sikkai, narlingi*, TEL.; *Wusel*, MADURA (MADRAS); *Bil-kambi*, KAN.; *Kadsige*, COORG; *Oosulay*, MAL.; *Krishna sirish*, SANS.

Habitat.—A moderate-sized, deciduous tree, met with in South India and the Deccan, also Ceylon and distributed to Abyssinia and Kordofan.

Botanic Diagnosis.—*Pinnæ* 8-20 and 1-3 inch long; *rachis* densely pubescent; *leaflets* 30-60, ⅛-¼ inch long, sessile, caducous, finely pubescent; *stipules* minute, caducous. *Heads of flowers* crowded in the axils of much-reduced leaves. *Pods* distinctly stalked, 6-9 inches by ¾-1 inch and 6-10-seeded.

Properties and Uses—

Gum.—It yields a good gum, not very much known. GUM. 687

Medicine.—§ "Described by Sanskrit writers as cooling and useful in erysipelas, eye disease, inflammation, and ulcers." (*U. C. Dutt, Civil Medical Officer, Serampore.*) MEDICINE 688

Structure of the Wood.—Sapwood large; heartwood purplish brown, beautifully mottled, extremely hard, with alternate, concentric, light and dark bands. TIMBER. 689

Skinner gives the weight at 70 lbs.; **Gamble's** specimens weighed 61 to 62 lbs. **Skinner** also says: "The wood is strong, fibrous, and stiff, close-grained, hard, and durable, superior to *sál* and teak in transverse strength and direct cohesive power; also that it is used for the beams of native houses and carts; the wood of the crooked branches for ploughs." **Beddome** states that it is a good fuel, and is extensively used for the locomotives at Salem and Bangalore. (*Gamble.*)

The Pink Siris Tree.

In the *Bombay Gazetteer, XV., I., p. 61,* occurs the following (in the account of the Konkan): "The tree is common and yields dark-brown, close-grained, and very strong and durable timber, one of the most favourite woods in Kánara. A seasoned cubic foot weighs about 70 pounds."

DOMESTIC USES. 690 **Domestic Uses.**—The natives use the leaves as a detergent for washing the hair.

691 **Albizzia anthelmintica.**

A native of Abyssinia, has recently attracted considerable attention as an anthelmintic. It is known as *Musenna* or *bisenna.* The Abyssinians employ the powdered bark to expel the tape-worm, to which they are subject owing to the habit of eating raw flesh. About two ounces of the powdered bark are taken in the morning either suspended in water or made into a confection with honey. It produces no pain and does not purge. The same day portions of the worm are expelled, the remainder next morning.

This tree might with advantage be introduced into India.

692 **A. Julibrissin,** *Durazz.; Fl. Br. Ind., II., 300.*

THE PINK SIRIS.

Syn.—MIMOSA KALKORA, *Roxb.; Fl. Ind., Ed. C.B.C., 418;* (?) A. JULIBRISSIN, *Willd.*

Vern.—*Sirin, kurmru, surangru, shirsh, shishi, búna, tandái, mathirshi, brind,* PB.; *Lal siris, baraulia, barau, bhokra,* HIND.; *Kalkora* (?), BENG.

Habitat.—A moderate-sized, deciduous, ornamental tree, with fragrant blossoms, met with in the Himálaya, from the Indus to Sikkim, ascending to 7,000 feet.

Botanic Diagnosis.—*Pinnæ* 8-24; *rachis* downy with a gland between the upper pinnæ; *leaflets* 20-50, sessile, sensitive, ¼ inch long, cuspidate, with the mid-rib close to the straight upper edge; *stipules* and *bracts* caducous. *Heads of flowers* not panicled but crowded in the leafless upper nodes. *Corolla* 3 times as long as the calyx; *pods* glabrous, 5-6 inches long by ¾ to 1 inch, 8-12 seeded, narrowed to the beak and to the short stalk.

MEDICINE. 693 **Medicine.**—Used like **A. Lebbek. Stewart** says the word *Julibrissin* is derived from *Gul abresham;* in Egypt "J" being pronounced as "G."

TIMBER. 694 **Structure of the Wood.**—Sapwood large; heartwood dark brown, almost black in old trees; beautifully mottled, shining. Annual rings distinctly marked by a sharp line. Weight 43 to 52 lbs. per cubic foot. Used to make furniture.

695 **A. Lebbek,** *Benth.; Fl. Br. Ind., II., 298.*

THE SIRIS TREE.

Syn.—ACACIA SIRISSA, *Ham.;* A. LEBBEK, *Willd. (DC. Prod.);* A. SPECIOSA, *Willd.;* MIMOSA SPECIOSA, *Jacq.;* M. SIRISSA, *Roxb.;* ALBIZZIA LATIFOLIA, *Boivin.*

Vern.—*Siris, sirín, sirár, siras, sirai, mathirshi, lasrin, kalsis, tantia, garso,* HIND.; *Sirisha, [illegible],* BENG.; *Pit shirish,* SANS.; *Chapot-siris,* SANTAL; *Tinia,* URIYA; *Vaghe, kot vaghe,* TAM.; *Dirasan, darshana, kat vaghe, pedda duchirram,* TEL.; *Kal baghi, bengha, dirisana, godda hunshe,* KAN.; *Chichola, mothá siras,* MAR.; *Doli, saras,* PANCH MAHALS; *Pilo sarshio,* GUJ.; *Sirasa, shirrus, suri,* SIND; *Kokko* or *kúk-ko,* BURM.; *Beymadá, gáchodá,* AND.

Habitat.—A large, deciduous, spreading tree, found wild or cultivated in most parts of India; grows in the evergreen mixed forests in the Sub-

The Siris Tree. | **ALBIZZIA Lebbek.**

Himálayan tract from the Indus eastward, in Bengal, Burma, Central and South India, ascending to 5,000 feet in altitude.

§ " A handsome and common tree in the town of Madras, grows best when self-sown; *yields a gum.*" (*Deputy Surgeon-General G. Bidie, C.I.E., Madras.*)

Botanic Diagnosis.—*Pinnæ* 4-8; *leaflets* 8-18, short-stalked, obtuse, oblique, 1-1¼ *inch long and* ¼ *broad. Heads of flowers not panicled,* 3-4 together. *Corolla* greenish yellow, twice the length of the calyx. *Pod* strap-shaped, yellow-brown, ½-1 foot long by ¾-1½ inch broad, 6-10-seeded.

An ornamental tree with light-coloured bark, exceedingly good for avenues. Its roots do not penetrate very deep; it may be propagated readily by cuttings.

Properties and Uses—

Gum.—It yields a gum, which is said not to be soluble in water, but **GUM. 696**
merely to form a jelly. It resembles gum arabic. **Roxburgh** states that he has often seen large masses of pure gum upon this plant, while other authors give conflicting opinions regarding its properties. **Mr. Baden Powell** says that, under the name of *lera*, it is used as an adulterant for pure gum arabic in calico-printing and in the preparation of gold and silver leaf cloths. The *Mysore Gazetteer* remarks that the tree yields a good gum. (*Vol. I., p. 47.*) " A dark gum oozes from wounds in the bark." (*Bombay Gazetteer, XV., Pt. I., 61.*)

Tan.—The bark is said to be used in tanning leather. **TAN. 697**

Oil.—An oil extracted from the seeds is considered useful in leprosy. **OIL. 698**

Medicine.—The SEEDS are officinal, forming part of an *anjan* used for **MEDICINE. Seeds. 699**
ophthalmic diseases (*Stewart*). They are astringent, and are given in piles, diarrhœa, gonorrhœa, &c. The oil extracted from them is con-
sidered useful in leprosy. The bark is applied to injuries to the eye **Bark. 700**
(*Madden.*)

The FLOWERS are considered by the natives a cooling medicine, and
are externally applied to boils, eruptions, and swellings; they are re- **MEDICINE. Flowers. 701**
garded as an antidote to poisons. The LEAVES are regarded as useful in
ophthalmia. (*Baden Powell's Panjáb Prod., s. v.* **Acacia speciosa,** *p. 345.*) **Leaves. 702**

§ "Powdered seeds in doses of 6 mashas=ʒ 1½ have been successfully administered in cases of scrofulous enlargement of the glands. A paste of pounded seeds and water is useful as a local application at the same time." (*Asst. Surgeon Gholam Nabi, Pesháwar.*) " This is sometimes used in ophthalmia, but my experience of it is too limited to enable me to give any opinion." (*Surgeon-Major C. J. McKenna.*) " The powder of the
root-bark is used to strengthen the gums when they are spongy and **Bark. 703**
ulcerated." (*Native Surgeon Ruthnam Moodelliar, Chingleput, Madras.*)

Fodder.—The leaves are used for camel fodder. It is often cultivated
as a fodder plant in Mysore. The tree grows rapidly and flourishes on **FODDER. 704**
almost any soil, especially on canal embankments and roadsides, affording both fodder and fuel where these are otherwise scarce. Deserves to be cultivated to a much greater extent than at present.

Structure of the Wood.—Sapwood large, white; heartwood dark
brown, hard, shining, mottled, with deeper coloured longitudinal streaks. **TIMBER. 705**
The annual rings in trees grown in the Panjáb are marked by a distinct line. Weight 40 to 60 lbs. per cubic foot. It seasons, works, and polishes well, and is fairly durable. The value of the tree may be inferred from the fact that the Burmese Government fixed a higher tax upon the felling of *kúk-ko* than for teak or any other tree. (*Burma Gazetteer, I., 128*).

It is used for picture-frames, sugarcane-crushers, oil-mills, furniture,

well-curbs, canoes (Burma), and wheel-work; in South India for boats. In the Andamans, where trees of large size are procurable, it is utilised for building, but more usually for house-posts. Used for furniture and picture-frames in Mysore. In the Deccan the wood is regarded as of excellent quality. In Northern India it is considered unlucky to employ the timber in house-building. (*Drury; Roxb., &c.*) It is a common practice to pollard the tree, the cuttings being used as firewood.

706 **Albizzia lophantha,** *Benth.; Fl. Br. Ind., II., 298.*

Habitat.—An Australian small tree or bush, now largely grown in India; naturalised on the Nilgiri Hills.

Botanic Diagnosis.—Closely resembles **A. amara,** only that the flowers are in spikes. One of the most rapidly growing trees for copses, affording temporary shade in exposed localities.

TAN. Bark. 707 **Tan.**—The bark may be used in tanning. It contains about 8 per cent. of *mimosa tannin;* "but **Mr. Rummel** found in the root about 10 per cent. of *saponin,* valuable in silk and wool factories. Saponin also occurs in **Xylia dolabriformis** of South Asia." (*Baron F. Von Mueller, Extra-Trop. Pl.*) The pods when crushed give out a peculiar

Pods. 708 smell, said to be due to some allied compound to that met with in mustard. (*Flück. and Hanb., Pharm.*)

709 **A. lucida,** *Benth.; Fl. Br. Ind., II., 299.*

Syn.—MIMOSA LUCIDA, *Roxb.; Fl. Ind., Ed. C.B.C., 417.*

Vern.—*Sil koroi,* BENG.; *Sil-karai,* ASS.; *Tapria-siris,* NEPAL; *Ngraem* LEPCHA; *Messguch,* ASS.; *Gunhi,* MAGH.; *Thanthat,* BURM.

Habitat.—A large, deciduous tree, met with in Eastern Bengal, Assam, and Burma.

Botanic Diagnosis.—*Pinnæ* unijugate; *leaflets* 2 to 4, rarely 6, oblong-acute, 2 to 4 inches long, glabrous, bright green. *Panicles of heads* umbellate or corymbose.

TIMBER. 710 **Structure of the Wood**—Heartwood hard, brown, with dark streaks and alternating dark and light-coloured concentric bands. Average weight 50 lbs. per cubic foot.

It is hard and good, and used for pots in Assam.

711 **A. odoratissima,** *Benth.; Fl. Br. Ind., II., 299.*

Syn.—MIMOSA ODORATISSIMA, *Roxb.; Fl. Ind., Ed. C.B.C., 418.*

Vern.—*Siris, sira, bhandir, bersa, bás, bassein, bansa,* HIND.; *Jang siris,* SANTAL; *Lasrin, karmbru, polach,* PB.; *Chichwa, chichola, yerjoohetta,* GOND.; *Chichora,* KURKU; *Jati-koroi, siris,* ASS.; *Sisoo,* GARO; *Koroi,* CACHAR; *Tedong,* LEPCHA; *Kalthuringi, kar vaghe, karu-vengé, bilwara, solomanim, sela vanjai, karuvaga,* TAM.; *Shinduga, chindu, telsu, yerruchinta, karu vage,* TEL.; *Pullibaghi, billawar, bilvara,* KAN.; *Siris, chichna, chichâda, siras, shiras,* KONKAN, BOMB., DUK., MAR.; *Kalo-sarasio,* GUJ.; *Kali saras* or *harreri,* PANCH MAHALS; *Húre mârá,* CINGH.; *Thitmagyi,* BURM.

Habitat.—A large, deciduous tree, met with in the Sub-Himâlayan tract from the Indus eastward, ascending to 3,000 feet in altitude; in Bengal, Assam, Burma, and Central and South India.

Botanic Diagnosis.—*Pinnæ* 6-8, with a gland between the 1-2 pairs; *leaflets* 16-40, sessile, obtuse, very oblique, glaucose beneath, strongly veined, with the mid-rib parallel to and at a little distance from the upper edge, ¾-1 inch by ¼-½ inch. *Heads of flowers* copiously panicled, each few-flowered, apricot-scented, pale-greenish white.

TIMBER. 721 "The wood is hard and ornamental, but the principal utility of the tree lies in its pulpy pods, which are produced in great abundance, and constitute a very fattening fodder for all kinds of pastoral animals, which eat them with relish." (*Mueller, Extra-Tropical Plants.*)

722 **Albizzia stipulata,** *Boivin; Fl. Br. Ind., II., 300.*

Syn.—MIMOSA STIPULACEA, *Roxb.; Fl. Ind., Ed. C.B.C., 418.*

Vern.—*Siran, kanujera, pattia, samsundra,* HIND.; *Chakua, amluki,* BENG.; *Oë, oi, sirin, shirsha, kasir,* PB.; *Chapún, kera serum,* KOL; *Bunsobri,* MECHI; *Kala siris,* NEPAL; *Singriang,* LEPCHA; *Sow, sau,* ASS.; *Selcho,* GÀRO; *Kat turanji,* TAM.; *Konda chiragu, chindaga,* TEL.; *Udala,* BOMB.; MAR.; *Phalári* (THANA), KONKAN; *Shembar,* PANCH MAHALS; *Kal baghi, hote baghi, bagana,* KAN.; *Kabal,* CINGH.; *Pokoh, bhúm-mai-sa,* MAGH.; *Cabal-mará-gass, búmaisa, bnumésa,* BURM.

Habitat.—A large, deciduous, fast-growing tree, met with in the Sub-Himálayan tract from the Indus eastward, ascending to 4,000 feet; in Oudh, Bengal, Burma, and South India.

Botanic Diagnosis.—*Pinnæ* 12-40, with many glands on the rachis; *leaflets* 40-80, $\frac{1}{12}$ inch or less in breadth, sessile, finely downy with a slightly recurved acute point; *stipules* and *bracts* large, membranous, downy, cordate-acute, persistent. *Heads of flowers* panicled, terminal racemes densely pubescent. *Pod* 5-6 inches by $\frac{3}{4}$-1 inch, pale brown, thin indehiscent, sub-sessile, 8-10-seeded.

This tree is attracting considerable attention in Assam. It has been found that tea flourishes better under it than when exposed to the sun. The most favourable explanation of this fact is that the leaves manure the soil; the roots, which do not penetrate deep, tend to open up the soil; while the shade is not to severe as to injure the tea, the leaves closing at night and during early morning.

Properties and Uses—

GUM. 723 **Gum.**—It yields a gum, which exudes copiously from the stem, and is used by the Nepalese for sizing their "Daphne" paper.

FODDER. 724 **Fodder.**—The branches are lopped for cattle fodder. (*Gamble.*)

TIMBER. 725 **Structure of the Wood.**—Sapwood large, white; heartwood brown, generally not durable, soft, shining. Weight 25 to 45 lbs. per cubic foot.

Fuel. 726 It is also used as fuel.

It is said by **Beddome,** probably quoting **Skinner,** to be used for building and for naves of wheels. **Kurz** says it is good for cabinet-work, furniture, and similar purposes. *Brandis' Burma List, 1862,* No. 27, says it is prized for cart-wheels and for wooden bells. In Bengal it has been tried for tea-boxes, for which purpose it will probably suit well; also for charcoal. Said to be much used in South Kanara.

ALBUMEN.

727 **Albumen.**

A term which, in chemistry, means a compound containing nitrogen in addition to the carbon, hydrogen, and oxygen of the starches. It is readily known by its coagulating with heat. The white of an egg is a good example of this compound in animal matter, but it is also largely present in vegetable substances, and especially so in the sap of plants.

In botanical science, however, the term "An Albumen" has come to have a widely different meaning. It is a layer of albuminous matter (albumen, fibrine, and casein, together with starches), surrounding the embryo and within the seed-coats. In the pea albuminous matter is stored within the embryo itself, filling its seed-leaves (the halves of the pea), and such a seed is therefore *exalbuminous* in botanical terminology. In

the castor-oil seed, on the other hand, the albuminous matter forms a distinct and complete layer around the embryo (or infant plant), and such is therefore regarded as an *albuminous* seed. An exalbuminous seed does not imply the absence of albuminous matter (chemically), but the absence of a peculiar layer of such matter around the infant plant and within the seed-coats.

Medicine.—Albumen is described in the *Indian Pharmacopœia* as emollient, demulcent, and nutritive. It acts as an antidote to the soluble salts of copper and zinc, and corrosive sublimate or creosote. MEDICINE. 728

Chemical Note.—§ "Albuminoid or proteid is a generic term given to the chief mass of nitrogenous material of plants and animals. All proteids contain nitrogen, carbon, hydrogen, oxygen, (sulphur and phosphorus). The white of egg is an example of an animal proteid, while in vegetable juices which are coagulated by heat, a substance exists which is either identical with or closely resembles egg albumen. Proteids have been divided into classes by **Hopper-Seyler**, and comprise egg-albumen, serum-albumen, myosin, globulin, fibrinogen, vitelleri-filiere. Besides these there are devoid albumens, obtained by the reaction of reagents on an albumen. Thus an albuminoid, which has been digested or dissolved by the gastric juice, is called a peptoric." (*Watts.*) "A peptoric differs in a most marked manner from the proteid from which it has been obtained. It is very soluble in water, and is not precipitated by heat. It is also soluble in dilute alcohol. It is uncrystallizable and devoid of odour and almost tasteless." (*Surgeon Warden, Prof. of Chemistry, Medical College, Calcutta.*)

§ "Eggs are very useful in cases of anæmia resulting from loss of blood or chronic discharges. They also act as an aphrodisiac. In combination with *kundur* it is employed in chronic bronchitis, and with *kuttan* in asthma. A mixture composed of eggs, *kobroba* and *tahashir* is said to act as a powerful astringent, and is used in hæmorrhage and chronic diarrhœa. Yolk of egg is often applied locally to the part bitten by a snake.

"A liniment composed of eggs, *rogungul*, and *babuna*, is said to be a very useful local application in ophthalmia and orchitis. An ointment made with *mom rogun* has been employed with benefit in cases of severe neuralgia and other painful affections. Yolk of egg, mixed with *sira kirmani*, and spread over a piece of paper and applied while warm over the loin, is said to remove the pain. Eggs are also used as a local application in cases of burns and scalds. Eggs burnt to ashes and mixed with honey are said to be very efficacious in removing the opacity of the cornea." (*Assistant Surgeon Gholam Nabi, Peshâwar.*)

ALCOHOL.

729

Alcohol.

The product of vinous fermentation. Through the agency of the fungus—Yeast—sweet liquids have their chemical constituents rearranged. They are then said to be fermented, and the spirit or pure alcohol formed may be separated from admixture by distillation.

Chemical Note.—§ "Chemically, alcohol means a neutral compound of oxygen, carbon, and hydrogen, from which an ether can be obtained. Usually, however, the term is restricted to ethylic alcohol—spirits of wine. Alcohol is a product of the fermentation of saccharine matter by the action of a fungus, the **Saccharomyas cererisiæ**, a constituent of yeast. In commerce three varieties of alcohol of different strengths are recognised—Absolute Alcohol, Rectified Spirits, and Proof Spirits. Absolute Alcohol is alcohol which has been deprived of water; Rectified Spirit is Absolute Alcohol mixed with 16 per cent. of water by weight; and Proof Spirit,

Absolute Alcohol with 50·76 per cent. of water. The strength, therefore, of an alcoholic liquid may be expressed in terms of one of these three varieties of alcohol. For excise purposes, "Proof," "under Proof," and "over Proof" are terms which are constantly employed. Formerly the strength of spirit was ascertained by pouring some of it over gunpowder
Proof spirit. and igniting the spirit. If the powder inflamed, the spirit was "Proof,"
730 but if weaker the gunpowder was too much moistened by the water, and would not explode, and the spirit was "under Proof." The composition of Proof spirit has been defined by Act of Parliament, and is of the strength already stated. If the spirit be stronger than Proof spirit, it is said to be so many degrees or per cent. over proof, or O. P., and if weaker, so much per cent. under Proof, U. P. A liquor described as being 20 degrees U. P. means that 100 parts of the spirit contain 80 parts of Proof spirit and 20 parts of water, while a liquor 20 O. P. means that if 100 parts of the spirit were diluted with water till the mixture measured 120 parts, the product would be Proof spirit. For purposes of manufacture,
Rectified spirit. &c., Rectified spirit is issued duty-free, after admixture with a certain percentage of commercial wood, *naphtha*. This addition renders the spirit
731 unfit for potable purposes, and the spirit so treated is known as Methylated
Methylated spirit. Spirit of Wine. In India, for certain trade purposes, the Excise Department permit the addition of caoutchouc in lieu of wood spirit." (*Surgeon*
732 *Warden, Prof. of Chemistry, Medical College, Calcutta.*)

MEDICINE. **Medicine.**—It is chiefly used for chemical purposes and in the pre-
733 paration of tinctures. Rectified spirit is a powerful diffusible stimulant, useful as an evaporating lotion, but not administered internally *per se.*

Alder, see **Alnus glutinosa** and **A. nepalensis.**

734 ALEURITES, *Forst.; Gen. Pl., III., 292.*

A small genus of EUPHORBIACEÆ, containing trees with long-petiolate, simple or lobed leaves with 2 glands at the base. *Calyx* 2-3-partite, valvate in bud. *Petals* 5, twisted, longer than the sepals. *Disk* present in both sexes, often minute or reduced to glands. *Stamens* indefinite, on a conical naked torus, erect in bud; *anthers* 2, parallel, dehiscing longitudinally. *Ovary* 2-5-celled, with a solitary ovule in each cell; *styles* as many as the cells, deeply bifid. *Fruit* drupaceous, of 2-5 cocci; endocarp crustaceous, exocarp succulent. *Seeds* compressed-globular, with a spurious white aril; *albumen* oily; *cotyledons* large, the radicle minute.

The generic name is derived from ἀλευρίτης, made of wheaten flour, because of the mealiness of the plant.

735 Aleurites cordata, *Müll.*

Syn.—ALEURITIES VERNICIA, *Hassk.*; A. CORDATA, *R. Br.*; ALÆOCOCCA VERNICIA, *Spreng.*

Vern.—*Tung*, CHINESE. Sometimes called the WOOD-OIL of CHINA.

Habitat.—This exceedingly interesting tree is said to have been found by **Wallich** in Nepal (*Wall., Cat. N., 7958*), but apparently it must be very rare, or its valuable properties are quite unknown to the natives of India.

VARNISH. Chinese wood-oil. **Varnish.**—In the Kew Report for 1880, p. 11, this is said to be the plant which yields the Chinese varnish (formerly supposed to be the same as
736 the Japanese varnish, **Rhus vernicifera**). *Samples of variously coloured* lacquers were exhibited at the Calcutta International Exhibition from Tonquin, which were most probably obtained from this plant. **Mueller** (*Extra-Tropical Plants*) says: "This tree, for its beauty and durable wood, deserves cultivation in our plantations in humid districts." "The oil is an article of enormous consumption amongst the Chinese, who use it in the caulking and painting of junks and boats, for preserving wood-work, varnishing furniture, and also in medicine." (*Flück. and*

Hanb., Pharm., 91.) Lindley (*Veg. Kingdom, 1847, pp. 278, 280*) states that the Ceylon gum-lac is made from **A. laccifera.**

Aleurites moluccana, *Willd.; DC. Prod., XV., pt. 2, 723.* 737

THE BELGAUM OR INDIAN WALNUT; THE CANDLE-NUT.

Syn.—A. TRILOBA, *Forst.*

Vern.—*Akrót, akola, jangli-ákrót,* HIND., BENG.; *Akshota,* SANS. (*Sakhárám Arjún, Bombay*); *Khasife-hindi, jousebarri,* ARAB.; *Girdagáne-hindi, chahar-maghse-hindi,* PERS.; *Jangli eranda, jelapa, jangli ákhróta* or *ákrót, jáphal,* BOMB.; *Akhoda,* GUJ.; *Jáphala, akhod,* MAR.; *Akrota,* CUTCH; *Náttu-akrótu-kottai,* TAM.; *Nátu-akrótu-vittu,* TEL.; *Nát-akródu,* KAN.; *Kakkuna,* SINGH.; *To-sikya-si,* BURM.; *Shih leih,* CHINA. The names given, in most parts of India, to this plant are those which more properly belong to the Walnut, the *ákrót.* It is therefore advisable to add the word "wild" = *Jangli-ákrót.*

Habitat.—A handsome tree, introduced from the Malay Archipelago, and now found in cultivation or run wild in many parts of South India. **Roxburgh** says of it: "A large tree, now pretty common in gardens about Calcutta." "Flowering time the hot season; seeds ripen in August." **Cleghorn** remarks that it thrives well in Madras.

Botanic Diagnosis.—Leaves and twigs covered with a brownish, stellate, scaly, minute tomentum. *Leaves* ovate, base truncate-obtuse, having two glands, acute or acuminate, often 3-lobed. *Panicles* on the extremities of the branches, covered with scaly tomentum and crowded with white flowers.

Properties and Uses—

Gum.—Bark smooth, olive-green, a gum often naturally exuding from the stem and found also upon the fruit. This gummy substance is said to be chewed by the Tahitians, especially that from the fruit. GUM. 738

Dye.—The *Treasury of Botany* says the root of the tree affords a brown dye, which is used by the Sandwich Islanders for dyeing their native cloths. This may be the brown dye of Tonkin, of which samples were exhibited at the Calcutta International Exhibition of 1883-84. DYE. 739

Oil.—NUT OIL OR ARTIST'S OIL.—The nuts of this plant contain 50 per cent. of oil, which is extracted and used as food and for burning. It is known as *Kekuna* in South India and Ceylon. The nuts when strung upon a thin strip of bamboo and lighted are said to burn like a candle. Strung upon strips of the wood from the palm leaf they are regularly used by the inhabitants of the Sandwich Islands, where the plant is called *Kukni,* and the torches are reported to burn for hours, giving a clear and steady light. The yearly production of the *kukni* oil in the Sandwich Islands is said to be 10,000 gallons. It is now exported to Europe for candle-making, and is reported to be equal to gingelly (Sesame) or rape oil. **Simmonds** reports that 31½ gallons of the nut yield 10 gallons of oil, which bears a good price in the home market. It may be obtained either by boiling the bruised seeds or by expression. OIL. 740

"The oil is very fluid, of an amber colour, without smell, congealing at 32° F., insoluble in alcohol, readily saponifiable, and very strongly drying. (*U. S. Dispens., 15th Ed.*) "The cake, after expression of the oil, is a good food for cattle, and useful as manure." (*Drury's Us. Pl.*) "The cake, left after the expression of the oil, given to a dog in the dose of about half an ounce, produced no vomiting, but acted strongly as a purgative." (*U. S. Dispens.*) These opinions would seem to be rather conflicting.

§ "The oil makes a capital dressing for ulcers." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*)

Medicine.—The kernels "yield on expression a large proportion of a fixed oil, which has been pronounced by the Madras Drug Committee MEDICINE Kernels. 741

(1855, p. 428) to be superior to linseed oil for purposes connected with the arts." Medicinally, a dose of about two ounces has been found to act in from three to six hours as a mild purgative, its action being unattended with either nausea, colic, or other ill effects. It approaches castor oil, and has been found quite as certain in its action, with the advantage of possessing a nutty flavour; dose ½ to 1 oz. (*Pharmacopœia of India.*) **Dr. Irvine** says the nut is a stimulant and sudorific: dose ʒii to ℥i.

Dr. Calixo Oxamendi (*Anales de Medicine de la Habana*) performed a series of experiments by which he arrived at the conclusion that the oil must be administered in much smaller doses than is commonly stated. He found that half an ounce was quite sufficient to move the bowels of an adult. He recommends that it be used as a substitute for other aperients on account of its having a pleasant nut-like taste and acting freely in three hours without giving pain or griping. **Dr. Oxamendi** attributes this property not only to the oil itself but to a peculiar resin which irritates the intestinal mucous membrane. He recommends gum arabic to be combined with it, and for external application in obstruent constipation, he suggests that it should be combined with Tinct. of Cantharidis and Ammonium Carbonate: ℞. Ol. Nucis Aleurites Trilobæ, ½ oz., Tinct. Cantharid. and Ammon. Carb. a. a. ʒiii. (*M. Linam.*)

FOOD. 742 **Food.**—It is cultivated for the sake of its fruit, which is generally 2 inches in diameter. **Roxburgh** says: "The kernels taste very much like fresh walnuts, and are reckoned wholesome."

Algarobilla and Algaroba.

TAN. 743 A tan obtained, chiefly in America, from certain members of the genus **Prosopis**, of which **P. pallida**, *Kunth*, **P. glandulosa**, **P. dulcis**, and **P. spicigera**, are the most important species. See **Prosopis**.

By some authors **Algaroba** is restricted to the Carob tree, **Ceratonia Siliqua**, which see. The *U. S. Dispensatory, 15th Ed.*, says that **Algarobilla** is the pod of **Balsamocarpon brevifolium**, a drug containing 60 to 68 per cent. of tannin and a large quantity of ellagic acid, but none in the seeds. It is obtained from Chili. **Dr. R. Godeffroy** (*in Archiv. der Pharm., XIV., p. 449*) regards this as a good source from which to prepare tannin. (*Year-Book, Pharm., 1879, 215; and 1882, 208.*)

The word Algaroba is said to be derived either from Algarobo, a town in Andalusa, or from the Arabic *Al*,=the, and *Kharroub*, the Carob-tree. It seems probable that the name is applied to a number of plants the pods of which contain a sweet mucilage—the pods which are alluded to in the Scriptures as the husks or beans.

744 ## ALHAGI, *Desv.; Gen. Pl., I., 512.*

A low shrub, armed with hard spines ½-1 inch long, belonging to the Natural Order LEGUMINOSÆ. *Leaves* simple, drooping from the base of the spines or branches, oblong-obtuse, coriaceous, glabrous. *Flowers* 1-6, axillary to a spine, on short pedicels. *Calyx* campanulate-glabrous, $\frac{1}{12}$ to ⅛ inch; teeth 5, minute. *Corolla* reddish, 3 times the size of the calyx; *standard* broad; *keel* obtuse. *Stamens* 10, diadelphous; *anthers* uniform. *Ovary* linear, sub-continuous; *joints* small, turgid, smooth.

The generic name is the Arabic for the plant *Al-hagu*, pronounced by the Egyptian Arabs *el-hagu*.

745 **Alhagi maurorum**, *Desv.; Fl. Br. Ind., II., 145.*

THE CAMEL THORN; THE PERSIAN MANNA PLANT.

Syn.—HEDYSARUM ALHAGI, *Willd.; as in Roxb., Fl. Ind., Ed. C.B.C., p. 574.*

ALHAGI maurorum.

The Persian Manna Plant.

Vern.—*Juwásá, jawása,* or *junvásá,* or *yavásá,* or *javásá,* or *javánsá,* HIND., BOMB.; *Zuwasha,* CUTCH; *Dulal-labhá, javáshá,* BENG.; *Duralabha, girikarnika-yavása,* SANS.; *Shutar-khár,* or *ushtar-khár, khár-i-shutr,* PERS.; *Alhaju, háj, aáqúl, shoukul-jamal,* ARAB.; *Girikarmika, tella, giniya-chettu,* TEL.

The names *Unt-katárá* and *únt-katyah,* **Moodeen Sheriff** says, are sometimes, but incorrectly, applied to this plant. The *Manna* is known as *Taranjabin.*

Habitat.—A widely-spread shrub of the Ganges valley and of the arid and northern zones. A native of the deserts of South Africa, Egypt, Arabia, Asia Minor, Greece, to Beluchistan and Central India, the Konkan, and the plains of the Upper Ganges and North-West Provinces. Very common near Delhi.

Properties and Uses—

Medicine.—The HERB is cooling and bitter and has antibilious properties. The twigs are often resorted to as a poultice or fumigation for piles; the FLOWERS are also sometimes used for this purpose. The thorny TWIGS are sold as the medicinal product, and the preparation generally used is the extract by evaporation of a decoction of these. This is called *Yávasarkará.* It is sweetish-bitter, and is a favourite remedy for the coughs of children. By the Hindús the FRESH JUICE is used as a diuretic in combination with laxatives and aromatics. The "expressed juice is applied to opacities of the cornea, and is directed to be snuffed up the nose as a remedy for megrim." (*Dymock, Mat. Med., W. Ind., 179.*)

MEDICINE. Flowers and Herb. 746
Poultice. 747
Twigs. 748
Extract. 749
Fresh Juice. 750

§ "The infusion has a diaphoretic action." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*)

Oil.—The oil, prepared with the leaves, is used as an external application in rheumatism. OIL. 751

Manna.—The Sanskrit writers do not appear to refer to the MANNA or sweet sugary excretion obtained naturally from the plant by shaking its twigs over a cloth. This is chiefly collected in Khorasan, Kurdistan, and Hamadan, and imported into Bombay from November to January. It is called *Taranjabin.* It occurs in small, round, unequal grains, of the size of coriander seeds, caking together and forming an opaque mass. **Royle** states that the Indian plant does not yield the manna, and that the *Taranjabin* of the bazars is imported into India from Persia and Bokhara. (*O'Shaughnessy.*) MANNA. 752

§ "I have never observed any manna or sweet sugary excretion on this plant, although I have seen it in every stage of its growth in large quantities in all parts of the Panjáb and North-West Provinces." (*Brigade Surgeon G. A. Watson, Allahabad.*) "The *Juwásá* trees in the districts of Muzaffernagar, Meerut, &c., on the banks of the Jumna yield *Taranjabin,* but only in small quantities. My assistant has seen it growing and has collected the manna in these districts." (*Surgeon-Major C. W. Calthrop, M.D., Morar.*)

"The editors of the *Pharmacographia* state that Alhagi MANNA is collected near Kandahar and Herat, where it is found on the plant at time of flowering. Specimens sent them by **Dr. E. Benton-Brown** and **Mr. T. W. H. Talbot** had the form of roundish, hard, dry tears, varying in size from a mustard seed to that of a hemp seed, of a light-brown colour, and agreeable, saccharine, senna-like smell. The leaflets, spines, and pods, mixed with the grains of manna, are characteristic. It is imported into India from Kábul and Kandahar to the extent of 2,000 lbs. annually, and is valued at 30 shillings per lb. According to **Ludwig,** it contains cane-sugar, dextrine, a sweetish mucilaginous substance, and a little starch." (*Surgeon Warden, Prof. of Chemistry, Calcutta.*)

Chemical Composition.—" According to **Villiers**, Alhagi Manna, after being boiled with animal charcoal and evaporated to a syrup, crystallized after some months in small brilliant crystals, which, on crystallization from alcohol, formed large white crystals of the formula $C_{12}H_{22}O_{11} + H_2O$. It is dextrorotatory, its power being + 94° 48', or for the sodium flame, + 88° 51'. On boiling with an acid, it is converted into glucose, and its rotatory power is reduced to that of glucose, *viz.*, + 53. It then reduces Fehlig's solution; nitric acid oxidizes it to mucic and oxalic acids. Its melting point is 140°. It is thus seen to be identical with Berthelot's melezitose. It crystallizes in monoclinic (clinorhombic) prisms. The mannite of Alhagi also contains cane-sugar, which may be isolated by treating the mother liquor of the melezitose with alcohol, and adding ether till a slight precipitate is formed. Crystals of cane-sugar are then deposited. The mother liquor acts like a solution of cane-sugar containing dextrorotatory foreign substances which are not fermentable with beer-yeast. (*Vide Jour. Chem. Soc., April, 1877.*)" (*Dymock's Mat. Med., W. Ind., 180.*)

FODDER. (Camel.) 753

Fodder.—In the hot season, when almost all the smaller plants die, this puts forth its leaves and flowers, which are used as a camel fodder. Just about this time the leaves and branches exude a gummy-looking liquid which soon thickens into solid grains; these are gathered by shaking the branches, and constitute the edible substance known as manna. This secretion, however, is apparently not found on the Indian plant, but is collected at Kandahar and Herat, whence small quantities of the manna are imported into Peshâwar.

DOMESTIC USES. Tatties. 754

Domestic Uses.—The twigs are much used for making the tatties (cooling mats) used in Upper India in the hot season.

ALISMACEÆ.

755 **Alismaceæ**; *Gen. Pl., III., 1003; Mono. Phanerg., DC., III., 29.*

A Natural Order of aquatic monocotyledons, with radicle sheathing, strongly marked leaves. *Flowers* hermaphrodite or monœcious. *Perianth* 6-merous, 2-seriate—a distinct calyx and corolla. *Stamens* hypogynous or perigynous, equal to or double the number of the perianth leaflets. *Ovaries* more or less numerous, whorled or capitate, distinct, 1-celled and 1- to 2-ovuled. *Ovules* campylotropous. *Fruit* a follicle. *Seeds* recurved exalbuminous; *embryo* hooked.

This Natural Order has its chief affinity to JUNCAGINEÆ (in the NAIADACEÆ), which only differ in their extrorse anthers, anatropous ovules, and straight embryo. The BUTOMEÆ are so closely related that they have been reduced to a tribe of the ALISMACEÆ, being only separated by their placentation and the number of the ovules.

FOOD. 756

Economic Properties.—There are 12 genera in this Order, ALISMA and SAGITTARIA being the largest and most abundant, both of which have representatives in India, found in tanks and marshes. Their economic uses are apparently unknown to the natives of India. For some time they enjoyed in Europe the reputation of being useful in the treatment of hydrophobia, having been pitched upon by empirics. The rhizomes are, however, largely eaten in many parts of the world. In China **Sagittaria chinensis** is cultivated as an article of food, and so also, in North America, is **S. obtusifolia.** In India **S. sagittæfolia** is found in every tank throughout the plains, and by desiccation the rhizomes of this species lose their acridity; in this condition they are eaten by the Tartar Kalmucks. Apparently the natives of India are ignorant of this property, and it would appear that great advantage might be taken of the edible rhizomes of **Sagittaria** in times of famine. (See **Sagittaria.**)

Alisma Plantago, *Linn.* 757

Common in tanks in Bengal; also in marshes and lakes; it extends throughout the Himálaya to Kashmír.

ALKALINE ASHES. 758

Alkalis, or **Alkaline Ashes,** or **Pearl-Ash.** 759

The ash produced by the incineration of plants may be referred to many classes, each characterised by the prevailing constituent present. Amongst these may be mentioned pearl-ash or alkaline earths; these contain potash. Barilla is a vegetable ash containing soda salts; Kelp, *bromine, and iodine ash. Silicon is also frequently present, especially* in the ash of graminaceous plants, and so also is lime in others. The first three are those of commercial importance. The following are the chief plants which yield pearl-ash in India :—

Abrus precatorius.	**Erythrina indica.**
Achyranthes aspera.	**Gmelina arborea.**
Adhatoda Vasica.	**Holarrhena antidysenterica.**
Alstonia scholaris.	**Indigofera tinctoria.**
Amarantus spinosa.	**Luffa ægyptiaca.**
Anthrocnemum indicum.	**Musa sapientum.**
Bamboo ash.	**Nerium odorum.**
Borassus flabelliformis.	**Penicillaria spicata.**
Butea frondosa.	**Plumbago zeylanica.**
Cæsalpinia Bonducella.	**Pongamia glabra.**
Caroxylon fœtidum.	**Shorea robusta.**
C. Griffithii.	**Stereospermum suaveolens.**
Calotropis gigantea.	**Suœda indica.**
Cassia Fistula.	**S. nudiflora.**
Cedrus Deodara.	**Symplocos racemosa.**
Euphorbia neriifolia.	**Vallaris dichotoma.**
E. Tirucalli.	**Vitex Negundo.**

These salts are largely used in India as mordants, but rarely in a pure form.

Of minerals alum and *sajjí-mátí* (an impure carbonate of soda, found as a natural earth) are those most used. (See **Auxiliaries, Dye.**)

ALKANET. 760

Alkanet, said to be derived from *al-kanna,* a dye supposed originally to mean the *henna* dye or **Lawsonia alba.** It is now restricted to the root of **Anchusa tinctoria** of China, a red dye, much used in colouring liquids. The Alkanet of Sikkim is obtained from **Onosma Hookeri,** *Clarke* (which see). Dr. Dymock informs me that a root is imported from Afghanistan as an alkanet which he thinks may prove a species of ARNEBIA. **Alkanna tinctoria,** *Tausch,* grows on sandy places on the Mediterranean coast.

ALLAMANDA, *Linn.; Gen. Pl., II., 690.* 761

A handsome genus of climbing APOCYNACEÆ; there are 12 species, chiefly inhabitants of Brazil and other parts of South America. They have been introduced and form much-prized additions to the flower-gardens of India.

762 **Allamanda cathartica,** *Linn.*

Syns. & References.—A. Aubletii, *Rohl.; DC. Prod., VIII., 318; Dymock, Mat. Med., W. India, p. 421.*

Vern.—*Jahari sontakká, pivli kanher, pili-kaner,* Bomb.

Habitat.—A large yellow-flowered shrub from America, much cultivated in India and run wild in the tidal back-waters of the western coast. (*Beddome.*)

Botanic Diagnosis.—This is the species most frequently seen in Indian gardens. The leaves are in fours, oblong-lanceolate; the flowers at the extremities of long trailing branches, tube 1 inch long, and the bell-shaped portion 2 inches long. This is a native of Guiana; it flowers freely in Calcutta gardens during the hot and rainy seasons.

MEDICINE. Leaves. 763 **Medicine.**—Dr. **Dymock** remarks: "Though not used in India, it has a medicinal reputation, the leaves being considered a valuable cathartic in moderate doses." **Ainslie** (*Mat. Ind., II., 9*) says that the Dutch consider an infusion of the leaves as a valuable cathartic.

A. Schottii, a native of Brazil, is even a still more showy species, having much larger flowers, with an extra tooth between the petals. **A. neriifolia,** another Brazilian species, is much more compact and shrubby, with broader leaves. The flowers are deep yellow streaked with orange, occurring in dense panicles. **A. violacea** has reddish-violet flowers. (*Treasury of Botany.*) **Firminger** says that he has never seen the Allamandas produce seed in India, but that they are all easily propagated by cuttings.

764 ## ALLÆANTHUS, *Thwaites; Gen. Pl., III., 361.*

Allæanthus Zeylanicus, *Thw.;* Urticaceæ.

Vern.—*Allandoo-gass,* Cingh.

Habitat.—A tree met with in the central province of Ceylon, altitude 1,000 to 2,000 feet.

FIBRE. 765 **Fibre.**—A very tough fibre is obtained from the inner bark of this tree, which is used by the Cinghalese for a variety of purposes. (*Thwaites, Enumaratio Plantarum Zeylaniæ, p. 263.*)

Allmania, see **Amarantaceæ.**

766 ## ALLIUM, *Linn.; Gen. Pl., III., 802.*

A genus of bulbous, herbaceous plants, belonging to the Natural Order Liliaceæ, containing some 250 species, confined to Europe, and the temperate and extra-tropical regions of Africa, Asia, and America.

Bulb tunicated. *Spathe* many-flowered. *Umbels* crowded. *Flowers* regular, 6-merous; *segments* distinct or only slightly united below. *Stamens* 6; *anthers* oblong, attached by the middle and on the back. *Ovary* superior, sessile, 3-celled; *stigma* 3-fid; *ovules* mostly 2 in each cell.

Allium is the classical name for the garlic, leek, &c.

767 **Allium ascalonicum,** *Linn.; Roxb. Fl. Ind., C.B.C. Ed., 288.*

The Shallot.

Vern.—*Gandhan, gandana,* Pb.; *Gandana,* Saharanpur, N.-W. P.; *Gandana,* Afg.; *Gundhun,* Beng.

Roxburgh gives this species the vernacular name of *peeaj*, but this would seem to be a mistake. The specific name is in honour of the ancient city of Ascalon, where Richard the First, King of England, defeated Saladin's army in 1192.

Habitat.—A hardy, bulbous perennial, native of Ascalon in Palestine. Has been cultivated from the remotest times by all the nations of

the East, entering largely into their diet. It is regarded as much milder than garlic. It was most probably introduced into England about the middle of the sixteenth century. (*Treasury of Botany.*) Flowers greenish white or purplish white; bulbs about the size of a nut, white.

Food.—The bulbs separate into what are termed cloves, like those of garlic, and are used for culinary purposes, being of milder flavour than the onion. They also make excellent pickle. It is cultivated apparently in Afghánistan for the sake of the leaves, which may be cut two or three times a year for 25 or 30 years. **Firminger** says that it is little known to Europeans in India, but that the cloves or small bulbs should be planted out in October about 6 inches asunder, and that by the beginning of the hot season the crop will be ready for use. **Balfour** recommends that it should be sown in the commencement of the rains in beds and propagated by dividing the roots: it will yield a crop in the cold season. FOOD. The Cloves. 768

Allium Cepa, *Linn.; Roxb. Fl. Ind., C.B.C. Ed., 287.* 769

THE ONION, *Eng.;* OIGNON, *Fr.;* ZWIEBEL, *Ger.*

Vern.—*Piyás*, HIND.; *Piyáj, palandu*, BENG.; *Piyás*, ASS.; *Piaj*, SANT.; *Palándu*, SANS.; *Basl*, ARAB.; *Piyás*, PERS.; *Dúngari*, GUJ., SIND.; *Kanda, piyaj*, BOMB.; *Kándá*, MAR.; *Kándá*, CUTCH; *Vella-vengáyam, irulli, ira-vengáy-am*, TAM.; *Vulli-gaddalu, nirulli*, TEL.; *Vengáyam, nirulli, kunbali*, KAN.; *Bawang*, MAL.; *Lúnú*, SINGH.; *Ky-et-thwon-ni, kesun-ni*, BURM.

References.—*Bentley and Trimen, Med. Pl., p. 280; Moodeen Sheriff's Supp. to Pharm. of India, p. 37; Baden Powell, Panjáb Products, I., p. 381.*

Dr. **Moodeen Sheriff** says that in some Indian languages the same names are applied to the onion as to the garlic, the latter being called the white onion—a name very easily confused with the names applied to the white forms of the true onion. *Kándá* is the HIND. for squill; it very much resembles the MAR. *kándé* for this plant.

Habitat.—Cultivated all over India. There are, in Bengal, two forms, known as the Patna and the Bombay; the onions of Janjira, Bombay, are much prized, being small and white. (*Bomb. Gaz., XI., 425.*) English seed does not as a rule succeed so well as country, because, before it can come to India in time for the Indian season, it is two years old. Onion seed will not keep for certain more than one year. **Firminger** recommends that selected bulbs be planted, and seed obtained from these. If planted in the cold season, they will seed about the beginning of the hot season; and if carefully preserved, after being well ripened and dry, the seed obtained in this way will be found to yield a good crop in the following cold season, from October to February.

Chemical Composition.—**Fourcroy** and **Vauquelin** obtained from the onion a volatile oil containing sulphur, albumen, much uncrystallizable sugar and mucilage, phosphoric acid, both free and combined with lime, citrate of lime, and lignin. The expressed juice is susceptible of vinous fermentation. The oil is essentially the same as that from **A. sativum,** consisting chiefly of allyl-sulphide ($C_8 H_5$)2 S. (*U. S. Dispens., 15th Ed.*)

Medicine.—The bulbs contain an acrid volatile oil, which acts as a stimulant, diuretic, and expectorant. Onions are occasionally used in fever, dropsy, catarrh, and chronic bronchitis; in colic and scurvy; externally as rubefacients, and when roasted, as a poultice. Considered by the natives hot and pungent, useful in flatulency. Said to prevent the approach of snakes and venomous reptiles. (*Baden Powell.*) MEDICINE. The Bulb. 770

They are also described as aphrodisiac and carminative. Eaten raw they are emmenagogue. The juice rubbed on insect-bites is said to allay

ALLIUM Cepa.

The Onion.

irritation; the centre portion of a bulb, heated and put into the ear, is a good remedy for earache. The warm juice of the fresh bulb is also used for this purpose. In addition to the oil obtained from the bulbs, the seeds yield a colourless clear oil used in medicines.

Opinions of Medical Officers.—§ "The bulb is crushed and the acrid smell emitted is utilised like smelling-salts for fainting and hysterical fits." (*Surgeon-Major Robb, Ahmedabad.*) "Said to increase the peristaltic action of the intestines, and is prescribed in obstruction. Used by natives in jaundice, hæmorrhoids, and prolapsus ani, also in hydrophobia. As an external application, onions are used in scorpion-bite and to allay irritation in skin diseases. They have antiperiodic properties attributed to them, and are said to mitigate cough in phthisis, and mixed with vinegar are used in sore-throat." (*Surgeon J. McConaghey, Shahjahanpore.*) "Used as decoction in cough." (*Surgeon G. C. Ross, Delhi.*)

Juice. 771 "Onion juice, mixed with mustard oil in equal proportions, is used as a liniment to allay rheumatic pains. The bulbs, made into a necklace, are worn as a charm to ward off the attack of cholera, and frequently kept suspended in front of the entrance to houses." (*Asst. Surgeon Anund Chunder Mukerji, Noakhally.*) "The onion promotes appetite and sexual desire; it acts also as a deodoriser, and is employed to correct the ill effects of the atmosphere, when cholera or any other epidemic disease is prevailing. Eaten raw, it acts as a diuretic and emmenagogue. Cooked with vinegar, it has been employed with benefit in cases of jaundice, enlargement of the spleen, and dyspepsia. The fresh juice is said to be a useful local application in cases of the bite of mad dogs; its internal exhibition at the same time accelerates the recovery. In scorpion-bite it has attributed to it the same properties." (*Asst. Surgeon Gholam Nabi, Peshâwar.*)

"I have found the onion very useful in preserving natives from scurvy." (*Surgeon L. Cameron, Nuddea.*) "The juice of the bulb in ℥iv to ℥viii doses, mixed with about ℥ii of sugar, is a capital remedy for bleeding piles; one dose a day." (*Asst. Surgeon Nundo Lal Ghose, Bankipur.*) "A medium-sized onion is eaten twice a day with two or three black peppercorns as a favourite remedy in malarial fevers; a decoction of onion is used in cases of strangury." (*Surgeon-Major John North, Bangalore.*) "Upon the cut surface of a large onion a little slaked lime is placed; this rubbed over the part stung by a scorpion gives immediate relief." (*Surgeon-Major D. R. Thompson, Madras.*)

"Soporific when eaten raw. The juice is an excellent stimulant in cases of faintness; it should be applied freely to the nostrils. Is also used locally for the cure of scorpion-bites. It is said that the aphrodisiac properties of onions are enhanced by preserving them in a well-stoppered pot and then permitting the latter to remain in 'a cowdung yard' for a period of four months. One onion treated after this method is said to produce strong aphrodisiac effects." (*Surgeon W. Barren, Bhuj, Cutch Bombay.*)

"The natives use this largely in cases of dysentery. It is prescribed thus: a grain of opium is buried in a bulb, and this is roasted under hot ashes, and is then administered to a patient suffering from acute dysentery. Good success follows this mode of treatment. Three ordinary-sized bulbs, with a handful of the leaves of the **Tamarindus indicus**, is made into a paste and used as a purgative." (*Surgeon Lee, Mangalore.*)

"Fresh juice of the bulbs rubbed on the body in case of sunstroke is attended with apparent benefit. A popular embrocation with the natives of Upper India, where, in the hot season, parents hang a number of onions on the chests of their children as a safeguard against hot winds. Roasted,

they are commonly given to children as a stomachic." (*Asst. Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*)

Food.—The onion is cultivated very extensively all over India, especially in the neighbourhood of large towns, and is consumed both by Europeans and natives. The Mussulmans of India never cook curry without onions, but the strict Hindús of Bengal regard them as objectionable, and rarely if ever eat them. The Patna onion is of a superior kind, and is much sold in the Calcutta markets. The onions of the northern provinces are larger and more succulent than those of Bengal and the southern provinces. Deprived of its essential oil by boiling, the onion becomes a mild esculent. FOOD 772

Onions, leeks, and garlic were cultivated in Egypt in the time of Moses, and Herodotus (B.C. 413) mentions an inscription stating that 1,600 talents, equal to £428,800, were paid for the onions and garlic eaten by the workmen engaged upon the erection of the great pyramid.

§ "When pressure of work or any other cause prevents the cooking of curry, the natives frequently eat onions with their daily meal, which, in the case of the poorer Bengalis, is stale rice and water with salt, and with the natives of Upper India coarse bread. The onion in these cases is eaten raw, for the purpose, apparently, of flavouring the meal." (*Mr. L. Liotard.*)

Allium fistulosum, *Linn.* 773

THE WELSH ONION; ROCK ONION; STONE LEEK.

A native of Siberia, said to have been introduced into Europe in 1629. Cultivated in gardens, but not admired as a culinary vegetable. It is a strong-rooted perennial plant, with sharp-pointed leaves, a foot or more in length. It never forms a bulb like the true onion, but has long tapering roots. From being very hardy it is generally sown to supply early onions for salad. (*Smith's Dictionary.*)

A. leptophyllum, *Wall.* 774

THE HIMÁLAYAN ONION.

The bulbs are regarded as sudorific: they are said to have a stronger pungency than ordinary onions. The leaves form a good condiment. Is this the species said to be exported from Lahoul?

A. Porum, *Willd.; Roxb., Fl. Ind., C.B.C. Ed.,* 287. 775

THE LEEK.

Vern.—*Kiráth or Kirás,* ARAB.; *Parú,* BENG.; *Tan kyet thoon,* BURM. (*Balfour.*)

This esculent plant has been known from time immemorial. According to some authors it was originally a native of Switzerland, but more probably, like the onion, it came from the East. It is mentioned in the sacred writings, and was cultivated by the Egyptians in the time of Pharoah. Pliny says leeks were brought into notice by the Emperor Nero. The leek has been the badge of Welshmen ever since the sixth century, and is worn on St. David's day in commemoration of a victory they had over the Saxons, when they were instructed to wear the leek as a distinguishing badge during the battle. (*Treasury of Botany.*)

Firminger says leeks are best propagated in India by sowing the seed broadcast on a small bed immediately the rains stop. When the seedlings are about six inches high they should be carefully transplanted, taking care not to injure the roots. They should then be planted in rows FOO 776

six inches apart. They require plenty of water and should be earthed up once or twice.

777 **Allium Rubelium,** *Bieb.*

Vern.— *ani pias, chiri piasi,* HIND.

Habitat.—Slender-leaved species, common in North-West Himálaya, extending into Lahoul.

FOOD. 778 **Food.**—The root is eaten raw or cooked.

779 **A. sativum,** *Linn.; Roxb., Fl. Ind., C.B.C. Ed., 287.*

THE GARLIC.

Vern.—*Lasan,* or *lahsan,* HIND.; *Rasún,* or *lasún,* or *lashan,* BENG.; *Naharu,* ASS.; *Rasun,* SANT.; *Maha-ushadha, lasuna,* SANS.; *Sum,* ARAB.; *Sir,* PERS.; *Lasunas,* MAR.; *Lasan,* GUJ.; *Shunam,* DUK.; *Vallai-púndu,* TAM.; *Vellulli tella-gadda,* TEL.; *Belluli,* KAN.; *Gokpas,* BHOTE; *Samsak,* TURKI; *Kyat-thou-bega, kesúm-phiu, kyet-thwunbya,* BURM.; *Sudu-lúnú,* CINGH.

References.—*Bentley & Trimen, Med. Pl., 280; U. S. Dispens., 15th Ed.; Supp. to Pharm. of India, p. 38; Treasury of Botany, Pt. I, p. 39; Watt's Dictionary of Chemistry, Vol. 1., p. 143; Sharp, in Proc. Amer. Pharm. Association for 1864.*

Habitat.—Cultivated all over India; **Firminger** says it is very much cultivated by the natives in most parts of India, and can be had cheap at any bazar.

It is propagated by planting out the cloves singly, in October, in drills, about 7 inches apart and 2 or 3 inches deep. The crop is taken up in the hot weather, and after being dried in the sun the BULBS are stored for future use.

Botanic Diagnosis.—*Bulbs* numerous; enclosed in a common membranous covering. *Stem* simple, about 2 feet in height. *Leaves* long, flat, acute, sheathing the lower half of the stem. *Scape* smooth and shining, solid, terminated by a membranous pointed spathe enclosing a mass of flowers and solid bulbils and prolonged into leafy points. *Flowers* small, white.

Chemical Composition.—§ "Allylic sulphide is the chief constituent of the oil obtained by the distillation of garlic with water; it also occurs, but to a smaller extent, in oil of onions. From the herb and seeds of the **Thlaspi arvense,** it can also be obtained together with sulphocyanide of allyl, and oil of mustard. The leaves of the **Sisymbrium Alliaria** yield oil of garlic, and the seeds oil of mustard. A mixture of these two oils is likewise yielded by the following: **Capsella Bursa-pastoris, Raphanus Raphanistrum,** and **Nasturtium.** In some cases the oils do not exist ready formed; for example, the seeds of **Thlaspi arvense** emit no odour when bruised, and they must be macerated in water some time before distillation." (*Watts.*) "Allylic sulphide is a colourless oil of sharp unpleasant odour, lighter than water. The crude oil has a most intense odour of garlic." (*Surgeon Warden, Prof. of Chemistry, Medical College, Calcutta.*)

Properties and Uses—

OIL. 780 **Oil.**—The seeds yield a medicinal oil, clear, colourless, and limpid. **Dr. Ainslie** remarks that an expressed oil is prepared from the garlic, which is called *Vallay pundu unnay;* it is of a stimulating nature, and the Vytians prescribe it internally to prevent the recurrence of the cold fits of intermittent fever; externally, it is used in paralytic and rheumatic affections. (*Cooke.*)

MEDICINE. 781 **Medicine.**—"As a medicine garlic was held in great repute by the ancient physicians, and was also formerly much used in modern practice; but in this country it is now rarely prescribed by the regular practitioner,

Opinions of Medical Officers.

ALLIUM sativum.

MEDICINE.

although it is still employed to some extent in the United States. Garlic is stimulant, diaphoretic, expectorant, diuretic, and tonic, when exhibited internally; and rubefacient when applied externally. It is also regarded by some as anthelmintic and emmenagogue." (*Bent. & Trim., Med. Plants, 280.*)

In India, Garlic is considered hot and aperient; given in fevers, coughs, piles, leprosy, being regarded as carminative, diuretic, stomachic, alterative, emmenagogue, and tonic, and much used by the natives in nervous affections. It is esteemed by the Hindús as a remedy in intermittent fevers. The bulb is given in confection for rheumatism. Externally, the juice is applied to the ears for deafness and pain. Garlic is, in fact, chiefly employed at the present day as an external remedy; it is resolvent in indolent tumours. Is largely used as a liniment in infantile convulsions and other nervous and spasmodic affections. It is also frequently used as a poultice, as, for example, in retention of the urine from debility of the bladder.

The properties of garlic depend upon a volatile oil which may readily be obtained by distilling the bruised bulbs. When purified this oil is colourless, and may be distilled without decomposition. When garlic has been eaten, the odour of the oil may be detected in the various secretions of the body.

Opinions of Medical Officers.—§ "Mixed with vinegar garlic is used as an astringent in relaxed sore-throat and relaxation of the vocal chords. It is also used in asthma, general paralysis, facial paralysis, gout, and sciatica; is much thought of in the treatment of flatulent colic. Supposed to prevent the hair turning grey when applied externally." (*Surgeon G. A. Emerson, Calcutta.*) "Eaten in its green condition by persons in the cold season, from an idea that it wards off attacks of rheumatism and neuralgia." (*Surgeon-Major J, Robb, Ahmedabad.*) "Sometimes used for blistering purposes, but takes a long time before having any effect." (*Surgeon-Major C. J. McKenna, Cawnpore.*) "Garlic is an excellent medicine in several forms of atonic dyspepsia. It appears, like onions, to be useful in keeping up the temperature of the body. It is a good antispasmodic. In bronchial and asthmatic complaints it is decidedly beneficial." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) "Mustard oil, in which garlic has been fried, is an excellent application for scabies, and for maggots infesting ulcers." (*Assistant Surgeon Nobin Chunder Dutt, Durbhunga.*) "The juice or the whole bulb is used with salt as a poultice in bruises and sprains, also in neuralgia, rheumatism, gout, and rheumatoid arthiotis, and to relieve earache." (*Brigade Surgeon J. H. Thornton, Monghyr.*) "The smell of garlic is said to kill snakes; they never come where it is kept. Garlic poultice is used for rheumatic pains and also in neuralgia; if kept long it is rubefacient. Garlic oil is stimulant and rubefacient, largely used in the bronchitis of children." (*Asst. Surgeon J. N. Dey, Jeypore.*)

"A clove or two of garlic, boiled in half an ounce of gingelly oil, (Sesamum) and used as an ear-drop in atonic deafness, has proved very successful in my practice. The juice in elongated uvula is used with the same effect as that of nitrate of silver." (*Honorary Surgeon Easton Alfred Morris, Negapatam.*) A necklet of the bulbs is worn by children suffering from whooping cough. The juice is sometimes given with hot water for asthma. (*Surgeon James McConaghey, Poona.*)

"The expressed juice is a common application as a rubefacient." (*Native Surgeon Ruthnam T. Moodelliar, Chingleput, Madras.*) "Expressed oil used for elongated uvula, is said to act better than nit. arg." (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*)

MEDICINE.

"Habitually eaten by many persons subject to rheumatism. Cocoanut or mustard oil, in which a few pieces of garlic have been boiled, is useful in scabies and other parasitic skin diseases." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*) "The juice is used by the natives to destroy lice. It also acts as a blister, and as such is frequently used by native practitioners." (*Surgeon S. H. Browne, Hoshangabad, Central Provinces.*)

"The bulb is washed and applied to the temples, and, acting as a counter-irritant, has been known to relieve severe hemicrania and other forms of headache." (*Surgeon-Major A. S. G. Jayakar, Muskat, Arabia.*)

FOOD. 782 **Food.**—Used as a condiment in native curries throughout the country.

§ "The bulbs of garlic are eaten almost daily by the natives." (*Brigade Surgeon G. A. Watson, Allahabad.*)

783 **Allium Schœnoprasum,** *Linn.*

CHIVES OR CIVES.

A cultivated pot-herb, allied to garlic, with purple flowers; a native of North Europe. Its hollow grass-like leaves, forming clustered tufts, are commonly seen in kitchen gardens in Scotland. It is indigenous to Great Britain, and is accordingly very hardy, standing repeated cutting off close to the ground; the leaves are used in salad and to flavour soup. **Firminger** says it is little known in India, but is propagated by division of the roots in October.

784 **A. scorodosprasmum,** *Linn.*

THE ROCAMBOLE.

A perennial, esculent lily, closely allied to garlic, but regarded as much milder in flavour. It is a native of Denmark and other parts of Europe; it is used in the same way as garlic and the shallot, but its small cloves are considered more delicately flavoured than either.

785 **A. sphærocephalum,** *Linn.*

Grows wild in Lahoul.

The root and dried leaves are eaten (*Stewart*).

786 **A. tuberosum,** *Roxb.; Fl. Ind., Ed. C.B.C., 287.*

Vern.—*Bunga-ghundeena,* BENG.

Roxburgh says of this plant: "The natives use it as an article of diet, as leeks are used in Europe." **Royle** simply refers to this as a plant collected by **Roxburgh**. There seems to be some mistake regarding it, however, for it appears not to have been collected since **Roxburgh's** time, and even **Voigt** in his *Hortus Suburb. Calc.* says this is "unknown to us, as well as to our oldest native gardeners, who have hitherto been unsuccessful in their endeavours to procure it from the neighbourhood" of the Calcutta Botanic Gardens, where **Roxburgh** most probably collected the plant.

The greatest possible confusion exists in India regarding the cultivated forms, and, indeed, regarding even the wild forms of the genus **Allium**; and it is probable that, in addition to all the preceding forms, many others are regularly known to the natives of India, and even cultivated and sold in our bazars. **Stewart** enumerates the following unknown species as met with on the Panjáb Himálaya: **A. sp. (? odorum)**—vern. in Jhelum valley

bhúk; in Ladák, *skodze.* **A. sp.**—vern. Jhelum, *khan;* Spiti, *phúndú.* **A. sp**—vern. *kiúr* in the Ravi Valley, and *kosse gokpa* in Ladák. **Stewart** also says that an unknown species is exported from Lahoul to Kúllú, to be eaten as a condiment by Hindús. (See **A. leptophyllum.**)

ALLOPHYLLUS, *Linn.; According to Gen. Pl., I., 396, reduced to* Schmidelia.

Allophyllus Cobbe, *Bl.; Fl. Br. Ind., I., 673;* SAPINDACEÆ. 787

Syn.—ORNITROPHE COBBE, *Willd.; Roxb., Fl. Ind., Ed. C.B.C., 328;* SCHMIDELIA COBBE, *Beddome, lxxiii.*

Vern.—*Thaukjot,* BURM.

Habitat.—A deciduous shrub of East Bengal, South India, Burma, and the Andaman Islands.

Structure of the Wood.—Grey, soft. TIMBER. 788

ALLSPICE.

Allspice or **Pimento.**—A small bush or tree. **Pimenta acris,** *Wight,* and **P. officinalis,** *Linn.,* MYRTACEÆ. 789

Habitat.—Native of the West Indies. **Cleghorn** reports that several trees are in Madras, but that the climate of the Carnatic does not seem to suit them. **Mason** states that this large tree is repeatedly met with in Tavoy, but it does not flower; he is probably mistaken, as the plant is a small tree.

It is much cultivated in the West Indies for the sake of its aromatic leaves and berries. They partake of the smell and flavour of the cinnamon, clove, and nutmeg. Largely cultivated in Jamaica in what are known as pimento-walks. The berries are highly spoken of as a substitute for tobacco, and are said to be very pleasant, but require to be smoked in a long pipe. They are also used as a spice to flavour food. An oil is obtained by distillation, equal to nutmeg oil; reputed to allay tooth-ache. The bruised berries are carminative, stimulating the stomach, and promoting digestion; they also relieve flatulency. **P. acris** is regarded as inferior to **P. officinalis.**

Almonds, Bitter and **Sweet,** see **Prunus Amygdalus,** *Bail.,* ROSACEÆ.

Almonds, Country, see **Terminalia Catappa,** *Linn.,* COMBRETACEÆ.

ALNUS, *Gærtn.; Gen. Pl., III., 404.* 790

A genus of trees belonging to the tribe BETULEÆ, of the Natural Order CUPULIFERÆ, a tribe which formerly was viewed as a Natural Order. The genus contains some 14 species, inhabitants of Europe, temperate Asia, and America, chiefly delighting in a moist soil, and most of them preferring the northern or alpine regions to the warm southern tracts of the temperate zones.

Leaves alternate, deciduous, rounded, blunt, serrate-penninerved, and furnished with tufts of whitish down, in the angles of the veins beneath. *Flowers* monœcious; *male catkins* long, pendulous appearing, in autumn; *stamens* 4. *Female-spikes* ovate cone-like, appearing in spring; after fructification the thickened scales of the cone open and allow the seeds to escape, the cone-like bodies remaining attached to the tree until next year. Compare with the 2-stamened condition of BETULA with its caducous cones.

Alnus dioica, *Roxb.; Fl. Ind., Ed. C.B.C., 658.*

A Euphorbiaceous plant. Syn. for **Aporosa dioica,** *Müll.-Arg.,* which see.

791 **Alnus glutinosa,** *Linn.; Brandis, For. Fl., 461; Hooker's Students' Fl., 346.*

THE ENGLISH ALDER; SCHWARZERLE, *Ger.*; AUNE GLUTINEUX, *Fr.*; ONTANONERO, *It.*

Habitat.—The English alder has apparently not been introduced into India.

Properties and Uses—

DYE & TAN. The Bark. 792 **Dye and Tan.**—The bark is used in dyeing and tanning. It contains about 20 per cent. of a peculiar tannin.

MEDICINE. The Bark. 793 The Leaves. 794 Cones. 795 **Medicine.**—The bark and the leaves are very astringent and somewhat bitter. The former has been used in intermittent fever, and the latter as an external remedy in the treatment of wounds and ulcers. Bruised leaves are also sometimes applied to the breasts with the object of arresting the milk. A decoction of the cones is used as a gargle.

TIMBER. 796 **Structure of the Wood.**—White, soft, and light, on exposure to air turning pale red; will decompose in a year if exposed alternately to wet and dry weather, but if buried in the ground or submerged in water no wood is more durable. There is no heartwood. Knotty trees often yield beautifully mottled wood. The alder is the badge of the Clan Chisholm. The wood furnishes the best charcoal for gunpowder. Used extensively in Europe for herring-barrels.

The following are indigenous species :—

797 **A. nepalensis,** *D. Don; Brandis, For. Fl., 460; Wall., Pl. As. Rar., t. 131.*

THE NEPAL ALDER.

Vern.—*Kohi, Kæ,* PB.; *Udish,* KUMAON; *Udis, udish, wusta,* N.-W. P.; *Udis, utis (Gamble), boshi, swa (Brandis),* NEPAL; *Kowal,* LEPCHA.

Habitat.—A tall, sparsely-branched, deciduous tree, whose leaves soon become completely perforated by insects. It occurs from the Ravi eastward, between 3,000 and 9,000 feet in altitude, extending eastward to the Khásia and Nagá Hills (*Watt*), and to the Kakhyen hills in Ava (*Kurz*).

Botanic Diagnosis.—The tree is easily recognised by its dark-green coloured bark in young trees, becoming brown and fissured with age. *Leaves* oblong to elliptic on a slender petiole, obtuse at the base, shortly acuminate. *Catkins* sessile; *cones* ovoid, shortly stalked. *Nuts* irregular, winged, often broadest at the apex. *Fruit* ripe in March.

Properties and Uses—

DYE. 798 **Dye.**—The bark is used for dyeing and tanning. By the Nagás and Mánipuris it is used in combination with **Rubia sikkimensis** and **R. cordifolia** to deepen the colour. See **Rubia.** "The bark is used in tanning and dyeing. It is also said to enter into the composition of native red inks." (*Madden.*)

OIL. 799 **Oil.**—Said to yield an oil resembling birch oil.

TIMBER. 800 **Structure of the Wood.**—Similar to that of **A. nitida,** but the pores are fewer and somewhat larger, and the medullary rays are broad and very numerous. Weight 27 to 28 lbs. per cubic foot.

It is used for tea-boxes in Darjeeling.

This is perhaps one of the commonest plants in North Mánipur and the Nagá Hills, extending into the mountains of North Burma. It is rare in Mánipur proper, owing to the prevalence of dry red clay. Every moist soil and river-bank in the region indicated from 2,000 to 8,000 feet in altitude is, however, full of it, and so also are some portions of the country to the south and west of the valley of Mánipur, extending into the

Northern Cachar hills. It might be propagated to an unlimited extent, and not only supply timber and fuel, but its bark might easily form an article of internal trade. How far it might prove practicable to extend the cultivation of this useful tree into the tea districts of Cachar, Sylhet, and Assam, remains to be proved, but if not already attempted, it seems worthy of a trial. It grows rapidly, stands being pollarded freely, and if not propagated for its light soft wood for tea-boxes, would form a valuable source of fuel, luxuriating in the damp, uncultivatable banks of rocky streams and river-beds.

Alnus nitida, *Endl.; Brandis, For. Fl., 460; Gamble, Man.Timb., 373.* 801

Vern.—*Shrol, saroli, sawáli, silein, rikúnra, cháp, chámb, tsápú,* or *chápu, piák, kúnsh, kúnsa, kúnich, niú, kosh, koe, rajáin, kúndash,* PB.; *Paya, udesh,* KUMAON; *Gira, ghushbe,* AFG.

Habitat.—A large tree, 80 to 100 feet in height, met with in the Pánjab Himálaya, ascending from 1,000 feet to 9,000 feet in altitude. **Brandis** says the largest trees are seen in the basins of the Jhelum and Chenab.

Properties and Uses—

Dye.—The bark is used for dyeing and tanning. DYE AND TAN. The Bark. 802

Fibre.—The young twigs are used for tying loads, rope-bridges, &c., and in the construction of baskets. FIBRE. 803

Fodder.—Leaves are sometimes used as fodder. FODDER. 804

Structure of the Wood.—Reddish-white, soft, close, and even-grained tough to cut; annual rings distinctly marked by harder wood near the inner edge of each ring.

Used for bedsteads and for the hooked sticks of rope-bridges. TIMBER. 805

The Indian Alders do not seem to possess, in the same degree at least, the properties of the English and American species. It is probable, however, that their properties are only unknown, and that they require to be made known in order to take an important place amongst the indigenous products of the country. "The bark of several alders is of great medicinal value, and a decoction will give to cloth saturated with lye an indelible orange colour." (*Porcher.*) "It contains a peculiar tannic principle. American alder has come into use for tanning; it renders skins particularly firm, mellow, and well coloured." (*Easton.*) "The bark contains 36 per cent. of tannin (*Muspratt*)." (*Baron F. Von Mueller, Extra-Trop. Plants.*)

ALOCASIA, *Schott.; Gen. Pl., III., 975; Mono. Phaner., DC., II., 497.* 806

A genus of herbs, belonging to the AROIDEÆ in the tribe COLOCASIEÆ, containing about 20 species, inhabitants of the tropics in Asia and the Malayan Archipelago. Tall herbs, with a succulent, sub-erect stem, marked with scars. *Leaves,* the younger all peltate, the older sagitato-cordate, the petiole elongated and possessed of a well-developed sheath. *Peduncles* often numerous and pointing upwards. *Spathe-tube* naked, ovoid or oblong, convolute, acrescent, and persistent. *Spadix* inappendiculate. *Flowers,* the upper male, the lower female. *Perianth* absent. *Ovary* 1-locular, or at the apex 3-4-locular; *ovules* few, orthotropous, erect from a basilar placenta; *micropyle* on the apex.

Alocasia cucullatum, *Schott.;* **Syn.**—ARUM CUCULLATUM, *Lour.* 807

A native of Bengal.

A. fornicatum, *Schott.;* **Syn.**—ARUM FORNICATUM, *Roxb.* 808

Used medicinally (*Roxb., Fl. Ind., Ed. C.B.C., 626*).

809 ## Alocasia indica, *Schott.*

Syn.—ARUM INDICUM, *as in Roxb., Fl. Ind., Ed. C.B.C., 625; A.* INDICUM, *Roxb., in Wight, Ic., III., t. 794.*

Vern.—*Mánkanda,* HIND.; *Mánkachú,* BENG., ASS.; *Mánaka,* SANS.; *Alú,* MAR.

Habitat.—Generally cultivated around the huts of the poorer classes in Bengal, its large leaves forming a striking feature of such localities.

Properties and Uses—

FOOD. 810 **Food.**—Its esculent stems and root-stocks are eaten in curries by people of all ranks. It is, in fact, an important article of food in Bengal; the edible stems, often 2 or 3 feet in length, may be preserved for months.

MEDICINE. 811 **Medicine.**—Said to be useful in anasarca; the flour obtained by pounding the dried stems is boiled along with rice-flour until all the water has evaporated, and is given to the patient, no other food being allowed. (Compare with **Colocasia antiquorum.**)

Opinions of Medical Officers.—§ "I have never used it solely as a medicine; but as food taken frequently, it seems to act as a mild laxative and diuretic. In piles and habitual constipation it is useful. Plants grown in loose soils and ash-pits are best. The tough portions should be rejected, and the stems and root-stocks boiled and the water thrown away, otherwise they are likely to irritate the throat and palate." (*Surgeon D. Basu, Faridpur.*) "The flour of old dried stems is a valuable article of food for invalids. It is an excellent substitute for arrowroot and sago, in place of which I have used it in many instances." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*)

"The starch contained in the edible stem seems much more easily digestible than rice; and in the milk treatment of cases of malarious saturation with anasarca, I have found this root useful to accustom the patient to return to starchy food. It has no medicinal virtue. I have used it extensively in the Rungpur Jail." (*Surgeon K. D. Ghose, Khulna.*) "*Mánkuchú* is a very agreeable vegetable in the convalescence of natives from bowel complaints. It is light and nutritious and somewhat mucilaginous. I prescribe it often in such cases. The root-stock is decorticated and cut in small pieces and boiled in water. It is then mixed with *brinjal* or some other vegetable and made into a curry with a little turmeric and salt." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) "The root-stocks are largely used for patients; they are juicy and easily digestible." (*Surgeon-Major E. C. Bensley, Rajshahye.*) "The ash of the root-stocks mixed with honey is used in cases of aphthæ." (*Assistant Surgeon Anund Chunder Mukerji, Noahkally.*)

812 ## A. montana, *Schott.*

Syn.—ARUM MONTANUM, *Roxb.*

The natives of the Northern Circars use the roots to poison tigers. (*Roxb., Ed. C.B.C., 652.*)

813 ## A. odora, *C. Koch.*

Syn.—ARUM ODORUM, *Roxb.*

Flowers are fragrant.

814 ## A. rapiformis, *Schott.*

Syn.—ARUM RAPIFORME, *Roxb.*

A native of Pegu.

ALOE, *Linn.; Gen. Pl., III., 776.* 815

A genus of plants with thick, succulent, and spiny leaves, belonging to the Natural Order LILIACEÆ, and comprising some 80 species, chiefly inhabitants of Africa, more particularly of South Africa and the Island of Socotra; now cultivated in all tropical and extra-tropical countries.

Stem absent or short erect, or arborescent and sometimes even branched. *Leaves* succulent, forming a rosette on the extremity of the stem, often spinous at the apex and sparsely spinously serrate on the margin. *Flowers* forming spikes, axillary in the uppermost leaves or terminal, nodding, cylindrical, connivent by the short teeth. *Stamens* 6, hypogynous, as long as the perianth or longer; *filaments* subundulate; *anthers* oblong dorsifixed. *Ovary* sessile, 3-celled, many-ovuled. *Fruit* membranous, 3-celled, bursting by loculicidal dehiscence. *Seeds* compressed.

The word Aloë is said to be derived from the Syriac, *Alwai*, and the Greek derivative ἀλόη, but in the 10th century the drug was known as Succotrina. In India it is known by the generic name of *Elwa, Elia,* or *Mushabbar*. Several species yield a bitter juice which, when inspissated, forms a drug of varying commercial value, according to the care with which it has been prepared, and the specific peculiarities of the plant or plants from which obtained. Indeed, it would seem probable that several species of Aloë afford each of the important commercial forms,—*viz.*, Barbados, Socotrine, Cape Aloes, and Natal Aloes. This being so, it has been deemed the most satisfactory course to treat first of aloes as met with in the druggist's shop, and then to endeavour to discuss the principal facts known regarding the plants from which the aloes met with in Indian commerce are obtained.

History of the Drug Aloes.—The following abstract, taken chiefly from the *Pharmacographia*, will be found to contain the more important facts connected with the early history of this drug: Aloes appear to have been known to the Greeks in the 4th century B. C., for the Arabian historian **Edrisi**, accounting for the Greek occupation of Socotra, attributes this to Aristotle having persuaded Alexander to take possession of the island that produces *aloes*. The original inhabitants were removed and Ionians placed in charge of the island, and of its aloe plantations. In the 10th century aloes were produced only in Socotra, and it is reported that they had greatly improved under the Greek management. Aloes were known to **Celsus, Dioscorides,** and **Pliny,** as well as to the later Greek authors and Arabian physicians. Aloes were recommended to Alfred the Great by the Patriarch of Jerusalem, and it may therefore be inferred that the drug was not unknown in Britain as early as the 10th century. In 1516, **Pires,** a Portuguese apothecary, the first ambassador sent to China, reports to Manuel, King of Portugal, that aloes are found in the Island of Socotra, Aden, Cambaya, and other parts, the most esteemed being that of Socotra. In the 17th century a direct trade was established between Socotra and England. **Wellstead,** who travelled in Socotra in 1835, reported that it must once upon a time have been far more extensively cultivated than at present. He describes it as growing abundantly in parched and barren places on the sides and summits of limestone mountains, at an altitude of 500 to 3,000 feet. **Mr. Wykeham Perry,** in 1878, brought specimens of the Socotra aloe to Kew, London, when it was discovered that it was quite distinct from the plant which, by botanists, had come to bear the name of Socotra. This new species was, by **Mr. Baker,** named in honour of its discoverer, and this interesting fact regarding aloes has since been confirmed by **Prof. J. B. Balfour,** who has clearly shown that the plant **A. Perryi** is the true source of the Socotrine Aloes of commerce. From about the 10th century it seems the cultivation of the aloe became in all probability distributed over the tropical portions of the globe.

ALOE. **Medicinal Properties of the Aloe.**

In the 17th century, **Ligon**, who visited the Island of Barbados, speaks of the Aloë as if it were indigenous. This was about 20 years after the first settlers had taken up their residence. He mentions a number of useful plants which they had introduced into the island. Barbados aloes first appeared in the London drug warehouses in 1693, Cape aloes in 1780, and Natal aloes in 1870. (*Flückiger and Hanbury's Pharmacog.*)

For further particulars regarding the history of Indian aloes the reader is referred to **A. vera.** (See page 186.)

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MEDICINAL PROPERTIES AND USES.

Cultivation and Manufacture.—In Barbados, where the plant is systematically cultivated, the plants are set 6 inches apart, in rows 1 to 1½ feet wide, the ground having been carefully prepared and manured. The plants are kept dwarf and free from weeds. The leaves are 1-2 feet long; they are cut annually. The cut leaves are rapidly placed in a V-shaped trough with the cut end downwards, and so arranged that the juice may drain from all the leaves into a jar below. These troughs are placed all over the plantation so as to be easily accessible to the cutters. By the time five troughs have been filled, the first is exhausted. The leaves are neither boiled nor pressed, and no use is made of them after the juice has drained off. The juice is next inspissated by evaporation, but it does not injure by being left for some time in the jar. (*Pharmacographia.*)

Description and Properties of the Commercial Varieties of Aloes.—In an interesting paper of much practical value, **Dr. Squibb** (*Pharmacist, 1873, p. 33; Year-Book of Pharm., 1874, p. 38*) discusses the merits of the commercial forms of Socotrine and Barbados aloes, describing the former in its therapeutic effect as comparatively mild and gentle and unirritating, with tonic and aromatic qualities, while the latter is harsh and drastic, producing more irritation, and much more liable to over-action. He recommends that only the better qualities of the so-called Socotrine aloes be prescribed to human beings, while he regards the various forms of Barbados as better adapted to the medication of animals. While this therapeutic distinction holds good—clearly separating the two classes—there are a whole series of forms of the drug, which, in their external and physical properties, blend into each other so completely that it requires almost professional skill to distinguish them. The former class is lighter in colour, with a pleasant but feeble aromatic odour. It is mainly by the odour that the forms of aloes are valued by the dealers, and it is therefore impossible to describe this test; the inferior kinds of aloes are harsh, strong, often fœtid, while the better qualities are faint and aromatic. Recently, the numerous forms of Socotrine aloes have, in the trade, been referred to two classes—red Socotrine and yellow Socotrine, the former being held in the highest esteem. **Dr. Squibb** made the curious observation that the red form is at first yellow, becoming red as it dries, while the yellow only deepens in colour, but never becomes red. The term Hepatic Aloes is exceedingly vague, and "appears to us unworthy to be retained." (*Flück. and Hanb.*) It is applied to any sort of liver-coloured aloes, its opacity having formerly been attributed to the presence of crystals, whereas it is now believed to be due to the presence of a feculent matter, the nature of which is unknown, although it is most probably produced through the fermentation caused by impurities such as pieces of sheepskin. **Dr. W. Craig** recommends that aloes should be administered only in the form of aloïn. He bases his opinion upon one or two important considerations:

"*1st.*—Aloïn may, by exposure to the air, undergo considerable chemical change without losing its physiological action as an active aperient.

"*2nd.*—The resin of aloes, when thoroughly exhausted of aloïn,

Chemical Composition of the Aloe.

possesses no purgative properties, and therefore cannot be the active principle of aloes.

"*3rd.*—The resin of aloes is not the cause of the griping which sometimes follows the administration of the drug; it is a perfectly inert and harmless substance.

"*4th.*—Aloïn is an activea perient, and in all probability is the only active principle of aloes.

"*5th.*—Being uniform in strength, its dose can be more accurately determined.

"*6th.*—Its dose being only half a grain to one grain, it can easily be introduced into tonic pills without making these too large.

"*7th.*—By using the active principle all impurities are excluded which are apt to cause griping." (*Year-Book of Pharm., 1875, p. 289.*)

The *Makhzan-ul-Adwiya* mentions four kinds of aloes as met with in India, *viz.*, Socotrine, Bokhára or Persian, Indian, and Arabian. The latter is said to be often adulterated with akakia and with gum arabic. The Bokhárian is pronounced the worst kind, being full of stones.

Chemical Composition.

References.—*Flück. & Hanb., Pharmacog., 1879, 686; U. S. Dispens., 15th Ed., 155; Tilden, Year-Book of Pharm., 1875, 540; Schmidt, Archiv. der Pharm., V., No. 6, 1876; Pharm. Journ., 3rd Series, VII., 70; Year-Book of Pharm., 1877, 38.*

All varieties of aloes have an odour very much of the same character, and a bitter, disagreeable taste. The odour is due to a volatile oil which the drug contains in minute proportions. The most interesting constituents of aloes, however, are the substances known under the generic term of aloïn. Chemically, these principles appear to be complex phenols. The name aloïn was originally used to designate the substance found in Barbados aloes, but this aloïn is now named Barbaloïn, and the aloïns contained in Natal, Socotrine, and Zanzibar aloes are known respectively as Nataloïn and Socaloïn or Zanaloïn. The three varieties of aloïn are crystalline, and by chemical tests can be readily distinguished. Aloes also contain resins, certain of which are soluble and the others insoluble in water. By the action of reagents aloes afford a large number of derivatives. (*Pharmacographia.*)

The aloïn which is met with in commerce is prepared chiefly, if not entirely, from Barbados aloes. **Dr. Tilden** recommends the following method for the separation of this substance. Crushed aloes is dissolved in nine or ten times its weight of boiling water acidified with sulphuric acid. After cooling and standing for a few hours the clear liquid is decanted from the resin and evaporated. The concentrated solution will be found to deposit a mass of yellow crystals which can be purified by washing, pressure, and by recrystallization from hot spirit. After repeated crystallization the aloïn is obtained in the form of beautiful yellow needles, which are fairly soluble in water and in alcohol, but difficultly so in ether. **Dr. Tilden** recommends for the isolation of *zanaloïn* **Mr. Histed's** process, which, though troublesome, is the only process at present known. Powdered aloes should be macerated in proof spirit to make a paste, and the liquid gradually expressed from the mass. The yellow cake remaining is purified by crystallization from water and afterwards from rectified spirit.

E. von Sommaruga and **Egger** and also **Rochleder** consider the aloïns to form a homologous series, for which they have assigned the formula $C_{17}H_{20}O_7$ barbaloïn, $C_{16}H_{18}O_7$ nataloïn, and $C_{15}H_{16}O_7$ socaloïn—compounds derived from anthracene $C_{14}H_{10}$. This opinion has not, however, met with the support of subsequent experimenters, and **Tilden** is of opinion that, on the contrary, barbaloïn and zanaloïn, and in

A. 816

ALOE. **Trade Returns of Aloes.**

CHEMISTRY. all probability socaloïn, are chemically identical and must be expressed by the formula $C_{16}H_{18}O_7$. **Tilden,** speaking of barbaloïn and zanaloïn, says "the two bodies resemble each other in appearance and in taste":—

(*a*) *Zanaloïn* is slightly paler in colour; more soluble; it contains more water of crystallization than barbaloïn. Moistened with nitric acid, it gives no immediate coloration, but on the application of heat an intense orange-red is developed.

(*b*) *Barbaloïn* gives with nitric acid an instant coloration, which fades quickly to orange.

Both zanaloïn and barbaloïn, under the prolonged action of nitric acid, give chrysammic acid, and both yield crystallizable chloro- and bromo-substitution derivatives which resemble each other very closely. Socaloïn is believed to be identical with zanaloïn.

(*c*) *Nataloïn* is widely distinct from these crystalline principles, but chiefly in its not forming chrysammic acid nor chloro- or bromo- derivatives. It is also much less soluble than either of the preceding.

On the main features of these opinions **Dr. Schmidt** supports **Dr. Tilden,** confirming the formula given for barbaloïn and zanaloïn.

Histed published a most beautiful and convenient test for the three principal forms of aloïn. A drop of nitric acid, placed on a slab, gives with barbaloïn and nataloïn a bright crimson, but produces little or no effect on socaloïn. Barbaloïn is further distinguished from nataloïn by adding a minute quantity to a drop of oil of vitriol, and allowing the vapour from a rod moistened with nitric acid to pass over the surface of the solution. Barbaloïn (and also socaloïn) will undergo no change, but nataloïn will assume a fine blue colour. The nitric acid colour produced with barbaloïn rapidly fades, but that with nataloïn is permanent unless heat be applied. These reactions may sometimes be produced with the crude drugs. "Aloes yields its active matter to cold water, and when good is almost wholly dissolved by boiling water; but the inert portion, or apothême of Berzelins, is deposited as the solution cools. It is also soluble in alcohol, rectified or diluted. Long boiling impairs its purgative properties by oxidising the aloïn and rendering it insoluble. The alkalies, their carbonates, and soap, alter in some measure its chemical nature, and render it of easier solution. It is inflammable, swelling up and decrepitating when it burns, and giving out a thick smoke which has the odour of the drug." (*U. S. Dispens.*, *157.*) The fact that heat affects the properties of the drug must be clearly borne in mind; since the heat used in melting, straining, and drying which, on account of the presence of impurities, often becomes necessary before it can be used medicinally, will, unless carefully performed, impair considerably the action of the drug.

817 **Trade Returns of Aloes.**

Aloes (Foreign Trade by Sea).

Years.	Imports.		Exports and Re-exports.	
	Quantity.	Value.	Quantity.	Value.
	Cwt.	R	Cwt.	R
1879-80	792	21,330	752	20,684
1880-81	1,029	24,721	840	19,561
1881-82	1,023	23,780	469	16,489
1882-83	1,345	29,514	783	24,113
1883-84	1,611	31,639	610	21,676

A. 817

ALOE abyssinica.

Jafferabad Aloes.

TRADE RETURNS.

Detail of Imports, 1883-84.

Provinces into which imported.	Quantity.	Value.	Countries whence imported.	Quantity.	Value.
	Cwt.	R		Cwt.	R
Bombay . .	1,593	30,709	Aden . . .	1,102	15,591
Sindh . .	18	930	Arabia . . .	489	15,768
			China—Hong-Kong	20	280
TOTAL .	1,611	31,639	TOTAL .	1,611	31,639

Detail of Exports, 1883-84.

Provinces from which exported.	Quantity.	Value.	Countries to which exported.	Quantity.	Value.
	Cwt.	R		Cwt.	R
Bombay . .	520	20,798	United Kingdom .	341	18,097
Madras . .	90	878	Straits Settlements	229	2,746
			Other Countries .	40	833
TOTAL .	610	21,676	TOTAL .	610	21,676

The following are the principal forms of Aloë met with either in cultivation in India, or in the drug of which a large import and internal trade exists :—

Aloë abyssinica, *Lam.; Baker, Linnæan Jour., XVIII., 174.* 818

JAFFERABAD ALOES.

Syn.—A. MACULATA, *Forsk.;* A. VULGARIS, *var.* ABYSSINICA, *DC. Plantes Grasses sub. t. 27.*

Habitat.—Dr. Dymock informs me that this plant is common on the coast of Bombay and Gujarát, and that it furnishes the round cakes known as Jaferabad Aloes. It is a native of Abyssinia and Central Africa.

Botanic Diagnosis.—*Stem* simple, 1-2 feet in height, 2-3 inches in diameter. *Leaves* ensiform, 1½-2½ feet long, broad-acuminate, green, often white spotted, base rounded. *Raceme* dense oblong; *bracts* lanceolate-acuminate, 3-4 lines long. *Flowers* yellow, base green, tube short, teeth long. *Stamens* often exserted. Introduced into Europe in 1777.

Medicine.—It seems probable that this species may contribute, along with the two following, to the so-called *Moka* Aloes imported from the Red Sea coast into Bombay, or by way of Zanzibar from Socotra, and re-exported to Europe. MEDICINE. Aloes. 819

Under the heading **Aloe abyssinica,** *Baker,* **Dr. Dymock,** in his *Materia Medica of Western India,* p. 667, gives an interesting history of the Indian Aloes. The Mohammedans, he informs us, learned the preparation and uses of the drug from the Greeks. Its manufacture spread from Africa and Arabia, ultimately reaching India. He further states that the Hindús, though unaware of the method of preparing the inspissated sap, have long been in the habit of using the plant medicinally under the name *Ghirta kumarí.* In Eastern and Southern India, the *Ghirta kumarí* is one of the forms of **A. vera,** probably an indigenous plant to India, while **A. abyssinica** seems to have been introduced. It may be the case, however, that all wild Leaves. 820

or cultivated Aloes of India go by the name of *Ghirta kumari.* (See **A. vera,** *var.* **officinalis.**)

Pickled. 821 **Pickled Aloes.**—**Dr. Dymock** says that the leaves and flower-stalks of this aloe (? **A. abyssinica**) are pickled by the natives of Gujarát after having been soaked in salt and water.

§ "The aloes cultivated in the Kanara district are more succulent, yielding larger quantities of viscid juice. The fresh leaves are used as emollients in lieu of linseed poultices, meal, flour, &c., for abscesses or whitlow. The leaf is first roasted and then laid open on its inner side, and applied whilst warm. It hastens suppuration." (*Surgeon-Major W. Nolan, M.D., Bombay.*)

822 **Aloë ferox,** *Miller*, is one of the principal plants from which Cape Aloes are obtained.

823 **A. spicata,** *Thunb.*, is also one of the Cape Aloes plants.

824 **A. succotrina,** *Lam.*, and **A. Perryi,** *Baker.*

THE SOCOTRINE ALOES OF COMMERCE; THE YAMANI OR MOKA ALOES OF BOMBAY.

In the present state of our knowledge of the subject it has been deemed advisable to discuss the various forms of the drug, commonly known as Socotrine aloes, under this head, without attempting to separate the two species mentioned above. Recent discoveries in the Island of Socotra itself, made by **Mr. Perry,** and later by **Professor Bayley Balfour,** have shown **A. Perryi** to be the species from which the pure Socotrine aloes is derived; but much of what is sold commercially as Socotrine aloes is doubtless got from other species, and chiefly from **A. succotrina.** This is specially true of the Socotrine aloes not obtained from the Island of Socotra.

Syn.—A. PERFOLIATA, *var.* SUCCOTRINA, *Curt.*; A. VERA, *Miller.* See BAKER *in Linnæan Journal, XVIII.*, *173.*)

Vern.—In the chemist's shop Aloes go by the same names as are given to the next species, *viz.*, *Sibr*, or *Sabir*, ARAB.; *Bóle-siyáh*, PERS.; *Musabbar, ilvá, yalvá*, HIND.; *Móshabbar*, BENG.; *Élvá, eliyá, musanbar*, DUK.; *Musambarból*, MAR.; *Kariya-pólam*, TAM.; *Múshámbaram*, TEL.; *Chennanáyakam*, MAL.; *Eliyá*, CUTCH; *Yeliyo*, GUJ.; *Mou*, or *mo*, BURM.; *Kalu-bólam, karibólam*, SINGH. The name of the Socotrine aloes is *Sibr-sagótari*, ARAB. Met with in all the bazars of India.

References.—*Flück. and Hanb., Pharmacog., 679; Med. Plants, Bentl. & Trim., IV., 283; U. S. Dispens., 15th Ed., p. 151; Pharm. Ind., 236; Royle, Mat. Med., Ed. Harley, 398; Pereira in Pharm. Jour., ser. I., vol. XI., p. 439; Forskal, Fl. Ægypt. Arab, p. 73; Wellstead in Journ. R. Geogr. Soc., V., p. 197; Kew Report, 1880, pp. 21 and 54; Year-Book of Pharm., 1874 to 1884; Pharm. Jour., vols. III., IV., V., VI., VII., VIII.; American Pharm. Soc. Proc., vol. XXV.*

Habitat.—**Dr. Trimen** writes me that he regards **A. succotrina** as indigenous to South Africa and not Socotra or the Red Sea districts; this is the modern opinion, although, as the name implies, it was formerly viewed as a native of the Island of Socotra. **A. Perryi,** as far as has been discovered hitherto, is peculiar to Socotra, and the presumption is that it is the species from which the Socotrine aloes is obtained in the Island of Socotra itself.

Botanic Diagnosis.—**A. succotrina,** *Lam.*—*Stem* woody, often 6 feet in height, strongly ridged with scars of the fallen leaves, often becoming dichotomously branched. *Leaves* crowded, the rosette 2 to 3 feet in diameter, ensiform, falcate, sessile, amplexicaul, 15 to 20 inches long, tapering to an acute point. *Scape* exceeding the leaves, angled, purplish

green; *flowers* numerous, forming a narrow, erect, spike-like raceme; *pedicels* erect, curved so that the flowers are pendulous; *bracts* shorter than the pedicels. *Flowers* about 1⅛ inch long, red below, orange-red or pinkish in the middle, with greenish white tips, deeply cut into 6 obtuse segments. *Stamens* 6, 3 sometimes exceeding the perianth.

A. Perryi, *Baker.*—*Stem* simple, 1 inch in diameter, scarcely rising above ground. *Leaves* crowded, much shorter than in the preceding and rounded at the base. *Racemes* dense; *bracts* lanceolate, sub-equal to the pedicels. *Flowers* red, 9-10 lines long; *segments* oblong, three times the length of the tube. *Stamens* included.

Medicine.—In small doses, the drug aloes, prepared from the juice of the leaves, is stomachic, tonic; in larger doses, purgative, and indirectly emmenagogue. It is a remedy of great value in constipation caused by hysteria and atony of the intestinal muscular coat. It is also very useful in atonic dyspepsia, jaundice, amenorrhœa, and chlorosis. Locally applied, dissolved in glycerine, it is valued as a stimulant application in skin diseases. (*Pharm. Ind.*) **MEDICINE. 824a**

Dr. Dymock informs me that a mixture of aloes and myrrh is known in the Deccan as *mussabar*, and that Socotrine aloes is largely imported into Bombay. It appears that **Dr. Dymock** (*pp. 669 and 670*) regards the Socotrine aloes as distinct from the *moka*. He may be correct in this opinion, but it seems doubtful if any Socotrine aloes can be said to be the product of but one species even when imported direct from Socotra, and it is more than probable that the purer forms of African aloes are regularly sold under the time-immemorial reputation of the Island of Socotra, the more so since all the imports from Socotra, preserving the old trade route, come by way of Zanzibar to Bombay and England. The distinction which it is possible to establish is that pure Socotrine aloes is the product of **A. Perryi,** while the aloes to which the name *moka* or Arabian aloes may in the future be restricted, is the product chiefly of **A. succotrina** and one or two allied species inhabiting the Red Sea coast and the Arabian coast of the Persian Gulf. It may accordingly be found convenient to refer Socotrine aloes of commerce to two great sections:— **Socotrine Aloes. Pure. 825** **Impure. 826**

(A) The Pure Forms of Socotrine Aloes (contain Socaloïn). 827

Speaking of these separate forms **Dr. Dymock** says of Socotrine aloes: "This drug is imported into Bombay *viâ* Zanzibar and the Red Sea ports. It is packed in skins, the packages varying much in size and shape, and often containing a large proportion of rubbish, such as pieces of hide, stones, &c. In Bombay the skins are opened, and the aloes repacked in boxes for exportation to Europe. The best Socotrine aloes is of a reddish-brown colour, hard externally, soft internally; the odour is aromatic and peculiar; when powdered or in thin fragments it is orange-brown; sometimes it is almost fluid."

Flückiger and **Hanbury,** in their *Pharmacographia* (*1879, p. 684*), say of this form: "The SOCOTRINE, so-called BOMBAY, EAST INDIAN, or ZANZIBAR ALOES, which when opaque and liver-coloured is also known as HEPATIC ALOES, is imported from Bombay into England in kegs and tin-lined boxes. When moistened with spirit of wine, and examined in a thin stratum under the microscope, good Socotrine aloes is seen to contain an abundance of crystals. As imported it is usually soft, at least in the interior of the mass, but it speedily dries and hardens by keeping," losing about 14 per cent. in the process. "Some fine aloes from Zanzibar, of which a very small quantity was offered for sale in 1867, was contained in skin." When it is fluid it is known as *Liquid Socotrine Aloes.* This was at one time supposed to be different from *Hepatic*

Indian Aloes.

Aloes, and that the latter owed its opacity to crystals. But it has been shown that the opacity is due to some feculent matter, and that therefore opaque aloes, from whatever plant derived, equally deserves the commercial name of hepatic aloes.

Bentley and Trimen say the colour of Socotrine aloes varies : "the reddish tint is also liable to great variation; thus sometimes the masses are garnet-red, at other times they are much paler, and when quite dry, are golden-red, and yield a golden-yellow powder. By exposure to air the colour is deepened. The fracture is usually smooth and resinous, but sometimes rough and irregular."

Impure Socotrine. 828

(B) The Impure Forms, or Yamani or Moka Aloes (contain Zanaloïn ?).

This, **Dr. Dymock** informs us, is imported from Arabia into Bombay. It is the kind of aloes most in use by the natives of India. "It varies much in quality. It is of a black colour in mass, and somewhat porous, but thin fragments are translucent and yellowish brown ; the odour is powerfully alœtic, without the aroma of Socotrine or Jafferabad aloes; medicinally it appears to be sufficiently active. With nitric acid it gives a deep-red colour, like Barbados ; the solution in sulphuric acid is not affected by nitric acid fumes." (*Mat. Med., W. Ind., 670.*) The *Pharmacographia* says : "A very bad, dark, fœtid sort of aloes is brought to Aden from the interior. It seems to be the *Moka Aloes* of some writers."

Special Opinions.—§ "Useful in combination with sulphate of iron in cases of irregular or suspended menstruation, also in hysteria, headache, constipation, and flatulence." (*Brigade Surgeon J. H. Thornton, B.A., Monghyr.*) "In sprains and inflammations, applications of aloes and opium are found to be very beneficial in allaying pain, &c." (*Assistant Surgeon Doyal Chunder Shome, Campbell Medical School, Sealdah, Calcutta.*) "Purgative, and emmenagogue when applied externally over the abdomen in puffiness of the abdomen. The tincture, in combination with simple soap liniment, when applied over the abdomen of children who cannot tolerate aperients by the mouth, acts freely on the bowels." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*)

"Given internally by the hakims in bronchial catarrh and jaundice; externally applied with lime-juice in contusions and sprains." (*Surgeon-Major J. T. Fitzpatrick, M.D., Coimbatore.*) "Formed into a paste with hot water, it is useful when applied to severe sprains and contusions." (*Surgeon-Major J. J. L. Ratton, M.D., M.C., Salem.*) "Aloes rubbed up with opium, myrrh, and white of egg, applied to any swelling, causes absorption, soothes and relieves pain." (*Surgeon-Major Henry David Cook, Calicut, Malabar.*)

829 **Aloe vera,** *Linn.*

BARBADOS ALOES, INDIAN ALOES, *Eng.*; ALOES, *Fr.*; ALOE, *Germ.*

Syn.—A. BARBADENSIS, *Miller*; A. VULGARIS (Bauhin), *Lam.*

Vern.—*Ghi-kavár, Ghi-kanvar,* or *ghigvár, kumári,* HIND.; *Ghirta-kumári, girta-kunvár,* BENG.; *Ghirta-kumári, kanyá,* SANS.; *Sabbárá, nubátussibi,* ARAB.; *Darakhte-sibr,* PERS.; *Eliyá* (the resin), *kor-kand* (the plant), *kumári, ghi-kanvar, kanvar-patha,* DUK.; *Koraphad,* MAR.; *Kunvar,* GUJ.; *Kanvár, kora kanda, kora-phad, lephee,* SIND.; *Katrash-ai,* or *Kattalai, shóttu-katrashai,* or *shóttu-katrazhai,* or *kattalai,* TAM.; *Kalabanda,* TEL.; *Kattruvásha,* or *kattála,* MAL.; *Lola-sorá,* KAN.; *Komarika,* SINGH.; *Tasávon-le-pá,* or *shasaon-le-pá,* BURM.

The resinous extract is generally known as *Sibr,* PERS. (See also names given under **A. succotrina.**)

Mr. J. G. Baker, in the *Linnæan Society's Journal, Vol. XVIII., p.*

Indian Aloes. | **ALOE vera.**

176, has established the synonyms above given, and formed under this species two varieties. **Bentley** and **Trimen**, in their *Medicinal Plants*, reduced all the names for the forms of this species to mere synonyms, under the name of **A. vulgaris**, *Lam.* **Mr. Baker** seems correct, and the varieties formed by him are well known to the natives of India, and their individual properties have been recognised in native practice from almost time immemorial.

Habitat.—There are many sub-varieties of this plant met with in cultivation throughout India, some of which have run wild, as, for example, on the coast of South India. All the forms of this species must, however, be described as natives of Northern Africa, from Morocco eastward; of the Canary Islands and of Southern Spain. They have long been cultivated in the West Indian Islands, Jamaica, Antigua, and Barbados, where they were probably introduced at an early date from the Canary Islands.

Botanic Diagnosis.—*Stem* short, 1-2 feet, 2-3 inches diameter. *Leaves* ensiform, densely crowded, 1½ to 2 feet long, broad at the base, attenuated at the apex to a blunt point, pale green, glaucose, distantly dentate. *Scape* 2-3 feet long, simple or branched. *Racemes* dense, ½ to 1 foot long; *bracts* lanceolate-acute, 3-4 lines long. *Perianth-tube* yellow, cylindrical, 9-12 lines long; *segments* three times as long as the tube; *stamens* and *style* distinctly exserted.

Properties and Cultivation of Barbados Aloes. 830

The plant is readily cultivated, growing in the driest situations and poorest soils. The bitter juice of the aloe is contained in vessels placed just below the epidermis. It escapes when the leaves are cut off close to the stem: it is at first colourless, but quickly acquires a brownish tinge on exposure to the air. Its activity seems to vary with the age of the leaves from which it is drained, and the season of the year. In Barbados, where this species is systematically cultivated, the leaves are cut annually in March and April, during the heat of the day. The better quality of aloes is that obtained by allowing the leaves to drain naturally, for if the leaves be artificially pressed, the juices of the leaf are mixed with the lateciferous fluid and the quality of the drug greatly impaired. The natural heat of the sun is also the best means of drying the inspissated sap, for if artificial heat be used, the active property of the drug is weakened. (*Bentley & Trimen.*)

General Character.—In addition to the forms of **A. vera**, the following are also cultivated in Barbados: **A. succotrina, A. purpurescens,** and **A. arborescens,** all of which and many hybrids between them yielding the Barbados Aloes of commerce.

In colour Barbados aloes is not uniform; it varies from a deep reddish brown or chocolate to almost black. It has usually a dull waxy fracture, and is almost perfectly opaque even at the margins. When it presents a smooth glassy fracture it is known as "Capey Barbados." Its odour is disagreeable and even nauseous; the powder of Barbados aloes is of a dull olive-yellow. It is much more powerful than Socotrine aloes, but more subject to produce griping pains. It is almost entirely soluble in proof spirit, and under the microscope the solution exhibits numerous crystals. It is said to give in aqueous solution a fine rose colour with chloride of gold or with tincture of iodine, a reaction which does not take place with other aloes.

Dye.—In *Spons' Encyclopædia* there occurs an account of the preparation of the dye "Chrysammic Acid." It is prepared by heating 8 parts of nitric acid with 1 part of aloes. After the violent action has subsided, a second proportion of aloes is added to the mixture until the fumes of DYE 831

hypo-nitric acid subside. The mass is then poured into water, when chrysammic flakes settle in the bottom of the vessel. These are washed several times in water. The crystals change their colour under varying circumstances, giving a purple colour to silk, black to wool, and pink to linen. A French firm has recently used it to give a beautiful brown known as vegetable brown, which is produced through the agency of sulphuric acid. This dye is bright; it resists strong alkaline action; it combines with most of the anilines and other dyes, economising them and rendering them thoroughly fast; and it is not expensive.

It would be exceedingly interesting to know if the existence of this dye or dye auxiliary be known to the cultivators of Indian aloes, and if it has ever been extracted in India. The uses of the dye are likely to be greatly developed, and it therefore seems desirable that it should receive the attention of the Indian authorities.

FIBRE. 832 **Fibre.**—The leaves yield a good fibre. It seems highly desirable that the idea of combining the preparation of the drug aloes with the separation of the fibre should be brought before the public. In the account of the preparation of the drug practised in Barbados (given in the preceding page), it is stated that after the sap has drained off the leaves are rejected and no further use made of them. This seems an unnecessary waste of material, since from these rejected leaves a most useful fibre could be prepared.

MEDICINE. Juice. 833 **Medicine.**—As a medicine the *inspissated juice* from the forms of this species is in India regarded as but little inferior to the imported Socotrine aloes. It is an aperient, and deemed highly beneficial to persons predisposed to apoplexy. The FRESH JUICE from the leaves is said to be cathartic, cooling, and useful in fevers, spleen, and liver disease, enlarged lymphatic glands, and as an external applicant in certain eye diseases. The PULP of the leaves is, in native practice, applied to boils, and is regarded as acting powerfully on the uterus, and useful as an emmenagogue. It is also largely used in veterinary medicine. The ROOT is supposed to be efficacious in colic.

Pulp. 834

Root. 835

836 **Var. littoralis**, sp., *Koening.*

Vern.—*Chhótá-ghi-kanvar, chhótá-kanvár,* HIND., DUK.; *Chhótá-jangli ánanash,* BENG.; *Shiru-katrásh-ai,* or *shiru-kattálai,* TAM.; *Chinna-kalabanda,* TEL.; *Cheru-katru-vasha,* MAL.; *Shime-kattáli,* KAN.; *Dhákutá kunvára,* BOMB.; *Nahání-kunvar,* GUJ.; *Lahání-kumári,* MAR. Ainslie gives the plant the Sanskrit name of *kúmari. Koyangali* is the Burmese name for a species of Crinum, but it is also sometimes applied to this plant.

Syn.—§ "This, in my opinion, is a stunted variey of **A. indica,** *Royle.*" (*Deputy Surgeon-General Bidie, C.I.E., Madras.*)

Habitat.—This is altogether a much smaller form than the typical condition of the species, having yellow flowers in simple spikes, with the bases of the leaves not half so broad as in the preceding, and always of a pale green colour. It has become quite naturalised on the southern coast of the Madras Presidency.

Botanic Diagnosis.—*Leaves* 15-18 inches long, 1½ broad; *scape* simple, 2 feet long.

MEDICINE. 837 **Medicine.**—**Ainslie** says: "The pulp of the leaves of this small and very succulent plant, when well washed in cold water, is prescribed as a refrigerant medicine in conjunction with a small quantity of sugar-candy. The same pulp so purified, and with the addition of a little burnt alum, the native practitioners consider as a valuable remedy in cases of ophthalmia." The opinion of Madras officers as to this local form of aloes would be most acceptable. **Dr. Waring,** in the *Pharmacopœia of India,*

says: "By inspissating the viscid juice of the leaves of **A. littoralis** collected at Cape Comorin, where the plant is in great abundance, the editor in 1853 prepared several ounces of excellent aloes, which proved actively purgative in the same doses that the officinal aloe is usually prescribed in. **Dr. W. Dymock**, of Bombay, corroborates the statement that this plant yields very good aloes, adding that he has tried it both in the fresh and dried state. It appears certain that, with a little care, aloes of good quality might be obtained from this source, in considerable quantities, at a cost far less than that of the imported article. The aloes procurable in the bazars (chiefly imported) is generally of a very inferior description. "The freshly-expressed juice is in almost universal use as an external refrigerant application to all external or local inflammations."

Dr. Dymock (*Mat. Med., W. Ind., 668*) gives an interesting account of Indian aloes from the pen of **Garcia de Orta**, a Portuguese physician, who, in 1534, accompanied **Admiral Martin Alfonso de Souza** to Goa. From this it would appear that the juice and fresh plant were at that time used in South India, and the species was most probably the **var. littoralis.** In **Clusius'** translation of **de Orta's** work occurs a prescription for the use of the fresh plant, *viz.*, aloe leaves sliced, 3 ozs., salt 3 drms., heat to boiling, strain, add 1 oz. of sugar: to be taken cold early in the morning.

§ "Laxative, tonic; useful in diseases of the spleen. The decoction of the root is prescribed as a febrifuge." (*Surgeon W. Barren, Bhuj, Cutch.*)

"Very largely used in Mysore as an aperient and emmenagogue." (*Surgeon-Major John North, Bangalore.*)

Var. officinalis, sp., *Forsk.* 838

Syn.—A. RUBESCENS, *DC.*; A. INDICA, *Royle.*

Vern.—*Lal-kumári, lal-ghigavár, kanvár,* HIND.; *Ghikawár,* N.-W. P.; *Ghirta-kamári,* or *ghirta-kanvár,* BENG.; *Ghi-kanvár, lal-ghi-kanvar, kanvár phod, kalbandá,* DUK.; *Kumár,* GUJ.; *Korphad,* MAR.; *Nabátussibr, e-ahmar,* ARAB.; *Darakhte-sibre-surkh,* PERS.; *Sirrúghá kuttalay* (see **Ainslie**), *shivappu katrásh-ai,* or *shivapp-kuttalai, shivappu-shhóttu-katrash-ai, kumári,* TAM.; *Ena-kalabanda,* TEL.; *Chovanna-katru-vasha,* MAL.; *Kempu-lóla-sará,* KAN.; *Ruta-komárika,* SINGH.; *Ava-tasávon-le-pa, shasávn-le-pa,* BURM.

Habitat and Botanic Diagnosis.—This is the form met with in a semi-wild condition in Bengal and the North-West Provinces. It has beautiful reddish and orange flowers, with the bases of the leaves purple-coloured and so dilated as to have in all probability suggested the name **A. perfoliata,** given by popular writers to this and many other species of aloe.

Medicine.—§"In cases of chronic fissures and ulcers about the rectum, indigenous aloes have been largely used by the natives both internally and externally. It acts also as an emmenagogue and anthelmintic. It is a favourite medicine for intestinal worms in children. As an aperient it is generally given in combination with *turkud* or scammony. Dissolved in uttar of roses it is used in various affections of the eye. Mixed with *bartung* it is said to be very useful in chronic discharges from the nose or ears. Dissolved in spirit it is used as a *hair dye,* and it is said that it also stimulates the hair to grow. Dissolved in warm water and spread over a betle-leaf and applied while hot to the belly of a child, it is said to act as an aperient." (*Asst. Surgeon Gholam Nabi.*) "A sweetmeat, *halwa,* is prepared from the pulp of the leaves and given in cases of piles, and apparently with very good effect." (*Surgeon-Major C. W. Calthrop, M.D., Morar.*) MEDICINE. 839

"The resinous extract obtained from this plant is applied to swellings

in the form of a paste to cause absorption. It is used internally by native practitioners in melancholia and brain diseases, complicated with gastric symptoms. It produces griping, to correct which is added confection of roses and mastich. Given as a night pill in hæmorrhoids. A paste of fresh aloes and turmeric relieves the pain of contusions." (*Surgeon G. A Emerson, Calcutta.*) "The pulp with a solution of alum is very extensively used by native practitioners in every form of ophthalmia, but especially in catarrhal and purulent ophthalmia." (*Asst. Surgeon Jaswant Rai, Mooltan.*)

"The inspissated juice, in combination with gum asafœtida, is applied as a warm plaster in colic and the pneumonia of infants. It is also given internally in these cases in doses of 1 grain with borax in the same quantity with the mother's milk." (*Lal Mahomed, Hoshangabad, Central Provinces.*) "It is applied over the abdomen for constipation and tympanitis." (*Surgeon-Major Robb, Ahmedabad.*) "I have seen the juice administered with powdered turmeric by village native practitioners in enlarged spleen." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*) "Aloes have been found useful in piles, mixed in small quantities with sulphur. It is applied by natives externally in the form of *lep*—paste—in pleurisy." (*Assistant Surgeon Bhugwan Das, Rawal Pindi.*) "A sort of pickle, prepared with aloe, salt, and ajowan, is very useful in colic and dyspepsia." (*Surgeon J. C. Penny, M.D., Amritsur.*)

"Inspissated juice, mixed with sugar, frequently given in gonorrhœa with great advantage." (*Brigade Surgeon S. M. Shircore, Moorshedabad.*) "The fresh juice of the leaves is taken with milk and water as a remedy for gonorrhœa and methritis. It acts as a mild purgative, emollient, and demulcent." (*Brigade Surgeon J. H. Thornton, Monghyr.*) "Hospital Assistant Gopal Chunder Gangooly, of the Noakhally Dispensary, reports that he has used the fresh pulp of the leaves, mixed with sugar, in cases of gonorrhœa, with good results; it acts as a demulcent." (*Surgeon Anund Chunder Mukerji, Noakhally.*) "The fresh juice from the leaves is cooling, diuretic; largely used by the natives in gonorrhœa. The tender pulp is eaten in rheumatism." (*Assistant Surgeon J. N. Dey, Jeypore.*)

"I have used it as a stomachic purgative in veterinary practice with much effect. It makes a good adjunct to sulphur, for internal use, in bad cases of mange. In the human subject, in cases of chronic cough due to dyspepsia, and in cases of foul evacuations, I have given it in 5-grain doses with *ghi*, in the former with sulphate of iron, in the latter two or three times a day, with much benefit." (*Surgeon K. D. Ghose, Khulna.*) "The indigenous drug, known in the bazars as *Musubbar*, has all the properties of the Socotrine or Barbados aloes." (*Surgeon R. D. Murray, M.D., Burdwan.*)

"A piece of the fleshy pulp (peeled), about two inches square, with 4 grains of turmeric, and 10 grains of burnt borax, is a favourite remedy for enlargement of the spleen associated with constipation of the bowels." (*Surgeon-Major E. C. Bensley, Rajshahye.*)

"One grain of bazar aloes, with 1 grain of bazar sulphate of iron and 1 grain of asafœtida, is often used by natives in the form of a pill for spleen enlargement." (*Surgeon K. D. Ghose, Bankura.*)

FOOD. 840 **Food.**—The pulp of the leaves is eaten by the poorer people in times of famine; the seeds also are eaten.

841 **ALOPECURUS,** *Linn.; Gen. Pl., III., 1140.*

A genus of grasses belonging to the Tribe PHALARIDEÆ, comprising in all some 20 species, inhabitants of Europe and temperate Asia.

The Alpinia or Galangal. ALPINIA.

Spike compressed, one-flowered, peduncled in the sheaths of the upper leaves; *glumes* 3-4, the 2 exterior empty, compressed, connate below, membranous and awnless. *Pale* 1, scarious, 5-veined, awned on the back; *stamens* 3; *style* long; *stigma* filiform, elongated, shortly hairy.

Alopecurus agrestis, *Linn.; Duthie's List of Grasses, 25;* GRAMINEÆ. 842

SLENDER FOX-TAIL GRASS; BLACK GRASS.

Habitat.—Found in the Panjáb in cultivated ground.

Botanic Diagnosis.—*Stem* erect, 1 to 2 feet high, roundish above; *panicle* tapering, slender. *Glume* glabrous, but with a row of short cilia on the back, acute, connected below; awn from near the base of the pale and projecting half its length beyond. A troublesome weed.

Fodder.—**Duthie,** quoting **Parlatore,** describes it as a good fodder grass, fresh or dry. FODDER. 843

A. geniculatus, *Linn.; Duthie's List of Grasses, 25.* 844

FOX TAIL-GRASS.

Vern.—*Pumila,* N.-W. P.

Syn.—A. FULVUS, *Sm.*

Habitat.—Inhabits the plains of Northern India, in wet places ascending the Himálaya to Kumaon and Kashmír valley.

Botanic Diagnosis.—*Stems* ascending, smooth, kneed and swollen at the joints, about a foot long, branching below, knots generally fleshy. *Panicle* cylindrical, 1-2 in. long. *Glume* blunt, connected below, ciliate, exceeding the pale; *awn* from near the base of the pale and projecting half its length beyond it. *Pale* when opened out oblong, blunt, slightly notched. *Anther* ultimately violet-yellow. *Styles* mostly combined.

Fodder.—**Mueller** describes it as a good fodder grass for swampy land. A variety, **A. pumila,** was found by **Royle** on the banks of the Jumna. FODDER. 845

A. pratensis, *Linn.; Duthie's List of Grasses, p. 26.* 846

MEADOW FOX-TAIL GRASS.

Habitat.—Inhabits the North-West Himálaya, 5,000 to 8,000 feet, ascending in Lahoul to 13,000 feet; also found in Kashmír and on the Panjáb plains. Is fond of rich pasture lands.

Fodder.—A perennial pasture grass, considered one of the best of its class. Sheep thrive well on it. **Loudon** mentions it as an excellent fodder grass in England. FODDER. 847

Since it requires two or three years to attain perfection, it is disqualified from becoming part of a rotation of crops. For fallow and waste lands it is, however, very valuable, especially in damp soils. It has been ascertained that if mixed with white clover, this grass, after the second year, will support five ewes and five lambs on an acre of sandy loam, especally if the soil contains lime. For permanent pastures in warm temperate climates this grass is one of the best.

ALPINIA, *Linn.; Gen. Pl., III., 648.* 848

A genus of SCITAMINEÆ belonging to the tribe ZINGIBEREÆ, containing some 40 species, inhabiting the tropical and sub-tropical regions of Asia, Australia, and Pacific Islands.

Rhizome thick, often aromatic, horizontal, creeping. *Inflorescence* a thyrsate, dense-flowered raceme, rarely a lax panicle. *Calyx* superior, forming a loose tube cut into 3 lobes. *Corolla* with the tube nearly as long as the calyx or sometimes a little longer. *Andræcium* of six staminodes,

in two rows of 3; *outer row* inserted at the mouth of the corolla, the two *posterior* or abortive stamens small, forming thickened, glandular, horn-like bodies or absent, the anterior forming the labellum or inner and fourth petal; *inner row* with the two *anterior* staminodes reduced to glands, inserted upon the apex of the ovary, and the *posterior* developed into the solitary fertile stamen. *Stamen* equal or nearly equal to or only half the length of the corolla; *filament* generally flattened, concave, embracing the style; *connective* flattened, not prolonged beyond the anthers, or if prolonged forming a short, broad, rounded, entire or bifid appendix. *Ovary* inferior, 3-celled, many-seeded; *style* filiform, passing between and behind the anthers, within the staminal sheath, often compressed below by the glandular staminodes; *stigma* capitate. *Fruit* globose, an indehiscent berry or rarely bursting into 3 valves.

The genus is named in honour of the Italian botanist **Prosper Alpinus.**

849 **Alpinia Allughas,** *Roscoe.*

Vern.—*Taro, taruko,* BENG.

Habitat.—A native of Bengal, Assam, Burma, and Celon; also of the Konkan in Western India.

MEDICINE. 850 **Medicine.**—The aromatic rhizomes are used by the natives medicinally.

851 **A. calcarata,** *Roxb.; Fl. Ind., Ed. C.B.C., 23.*

Habitat.—A native of China, cultivated in gardens in India; introduced in 1799.

Botanic Diagnosis.—*Leaves* linear-lanceolate, polished. *Spikes* compound, erect. *Flowers* large, in pairs or more, expanding at different times. Outer *petals* 3, linear, equal; *labellum* ovate-oblong, apex curved and bifid.

MEDICINE. 852 **Medicine.**—**Dr. Moodeen Sheriff** says that this is sold as a substitute for galangal in Haidarabad and other parts of India. The rhizomes, however, possess no pungency.

A. Cardamomum, *Roxb.*, see **Elettaria Cardamomum,** *Maton.*

853 **A. Galanga,** *Willd.*

The Rhizome.—THE GREATER GALANGAL, or JAVA GALANGAL, *Eng.;* GALANGA, *Port.*

The Fruit.—THE GALANGAL CARDAMOM.

Syn.—AMOMUM GALANGA, *Lour.*

Vern.—*Kúlanján, kúlinján, bará-kalíján,* or *bará-kúlanján,* HIND., BENG.; *Kolinjan,* GUJ.; *Bari-pán-ki-jar, malabari-pánki-jar,* BOMB.; *Kosht-kulinján,* MAR.; *Bará-khúlanjan, bari-pán-ki-jar,* or *sufédpán-ki-jor,* DUK.; *Kunjar, kathi,* SIND; *Dumparástma, kúlin-jána,* SANS.; *Khúlanjáne-qasbi, khúlanján-e-kabir,* ARAB.; *Khusravedárúé-kalán,* PERS.; *Péra-rattai,* TAM.; *Pedda-dumpa-rásh-trakam,* TEL.; *Péraratta,* MAL.; *Dumpa-rásmi,* KAN.; *Padagoji,* BURM.

Many of the names for this root-stock indicate an erroneous idea that it is the *root* of the betel-leaf plant, *viz., pan-ki-jar.* **Hanbury** suggests that the Arabic word *khalanjan* may have been derived from the Chinese *liang-kiang* (wild ginger), which in Europe became further corrupted into galangal, garingal, and (in German) galgant.

Habitat.—A perennial plant, native of Java and Sumatra, now cultivated in East Bengal and South India.

Botanic Diagnosis.—A perennial with broad, lanceolate, sessile, sheathing *leaves,* having a short, rounded, ciliate ligule, from 12-24 inches long by

4-6 broad; *stem*, when in flower, 6 feet high, the lower half embraced by the smooth leaf-sheaths. *Panicle* terminal, erect, oblong, composed of numerous spreading, simple, dichotomous branches, each supporting 2-3-6 pale-greenish white, faintly fragrant flowers. *Calyx* scarcely the length of the corolla-tube. *Labellum* oblong, stalked, arching towards the stamen, lip bifid. *Capsule* the size of a cherry, deep orange-red; *seeds* often only one in each cell. (*Roxb.; Hance, Linn. Journ., XIII.*)

Description of Bazar Products.—THE RHIZOME.—*The Greater Galangal.*—Recognised from the *Lesser Galangal* by its larger size, feebler odour and taste, and by its deep orange-brown skin, contrasting prominently with the pale buff hue of the internal structure.

THE FRUIT.—*The Galangal Cardamom.*—About half an inch long, oblong, somewhat constricted in the middle, or at times even pear-shaped, obscurely three-sided. Often shrivelled on one side from being collected when immature. In colour from pale to deep reddish brown; externally and internally whitish. Seeds united in a three-lobed mass, invested by a white integument, each mass consisting of two seeds, one above the other. Seeds ash-coloured, three-cornered, finely striated towards the hilum; connected to the axillary placenta by a long, broad funiculus. Aril tough, nearly surrounding the seed; seeds pungent, burning, with an aroma resembling that of the rhizome. (*D. Hanbury, Science Papers, 107.*)

History.—**Garcia de Orta,** physician to the Portuguese Viceroy of India at Goa in 1563, was the first writer who pointed out that in India there were two forms of Galangal, the lesser and more powerful root-stock imported from China, and the larger a native of Java. The former alone is that met with in Europe, a rhizome partaking of little medicinal virtues that are not possessed by ginger, but which, nevertheless, enters into many ancient prescriptions still in use.

Dye.—**Mr. Buck** says that this root-stock is imported into the North-West Provinces from the Panjáb, and is used in calico-printing along with myrabolans. DYE. 854

Medicine.—The rhizomes of this species are aromatic, pungent, and bitter, and are used in the form of an infusion in fever, rheumatism, and catarrhal affections. As a drug they are supposed to improve the voice. MEDICINE. Rhizome. 855
The aromatic tubers are sometimes used as carminative or fragrant adjunct in complex prescriptions, but they have nothing peculiar in their properties or action. (*U. C. Dutt.*) How far these properties may have been intended to be attributed to this root-stock or should have rather been given to **A. officinarum** cannot be accurately determined. The statements of Indian authors have to be accepted for the present, but it seems probable that future enquiry may show that, while both the greater and the lesser galangals are regularly imported into India, as far as their medicinal properties are concerned, the former is only used as a substitute for the latter, being commercially less valuable and less active in its therapeutic properties. It is, however, difficult to determine in many cases to which species authors refer. **Dr. Irvine,** in his *Medical Topography of Ajmere,* says: "Root of this plant is hot and stimulating; used in *mesaliths,* has a sweet scent; is put into bazar spirits to make it more intoxicating." This habit of flavouring spirits with galangal also prevails in Russia,—see under **A. officinarum.** The seeds also possess similar medicinal properties. Galangal Cardamoms. 856 Seeds. 857

§ "Hakims use it in impotence, bronchitis, and dyspepsia. It is disinfectant, used to destroy bad smells in the mouth or any other part of the body. It is also advocated in diabetes mellitus." (*Assistant Surgeon J. N. Dey, Jeypore.*) "In Mysore a domestic medicine, much used by old people with bronchial catarrh." (*Surgeon-Major John North,*

Bangalore.) "I have known natives who think this drug improves the voice." (*Surgeon-Major C. J. McKenna, Cawnpore.*)

858 **Alpinia Khulanjan,** *Moodeen Sheriff, Suppl. Ind. Pharm., 268.*

Habitat.—§ "This plant is found growing in several gardens at Madras, and its rhizome, when dried, bears the greatest resemblance to the Lesser Galangal (**A. chinensis**). The root is not sold in the bazar, but when sent there, it was recognised by the same native names as those of the Lesser Galangal.

"A few years ago, when I first found the plant, I thought it to be **A. chinensis,** but on examining it several times when in flower, I found it to be a new species of **Alpinia,** not hitherto described by anybody, as far as my knowledge extends. I have therefore named it **Alpinia Khulanjan,** after its native appellation *khúlanján,* and have described it as minutely as I could in the *Supplement to the Pharm. of India,* pp. 268 and 269."

Description.—"If the root of this plant is cut into pieces and dried, it presents the following characters: Tuberous, about the thickness of the little finger, somewhat thicker at one end than at the other, from one and a half to three inches long, often knotty and forked, reddish brown externally and greyish internally, annulated or marked with white rings, slightly wrinkled; smell warm and aromatic, and taste strongly pungent and peppery. This root is somewhat smaller and lighter in colour than the Lesser Galangal of the shops, but slightly stronger in smell and taste."

MEDICINE. 859 **Medicine.**—"With regard to the medicinal properties of the root of **A. Khulanjan,** it is not only stimulant, carminative, stomachic, and expectorant like ginger, but also a very good stimulant tonic. In addition to all the diseases in which ginger is indicated, it is very useful in some nervous disorders, as neuralgia, functional impotence, nervous debility, &c. It has also proved useful in several cases of incontinence of urine. Its preparations and doses are the same as those of ginger, to which it is also preferable in another respect, *viz.,* that it is neither attacked by insects, nor destroyed by any length of time. It is best administered in powder and tincture, the latter being prepared exactly in the same manner as the tincture of ginger, except the quantity of the root, which is to be four ounces instead of two and a half. Doses of the powder, from 10 to 30 grains, and of the tincture, from 30 minims to two drachms." (*Honorary Surgeon Moodeen Sheriff, Khan Bahadur, Triplicane Dispensary, Madras.*)

I have not seen a specimen of the plant referred to above by **Dr. Moodeen Sheriff,** but from his description (which was published in the *Supplement to the Indian Pharmacopœia, 1869*), it would seem to be the same plant which **Dr. Hance** described in the *Linnæan Journal, Vol. XIII., p. 6, 1871,* under the name of **A. officinarum.** If this conjecture proves correct, according to the rule of priority, the information given under **A. Khulanjan,** and that which, further on, has been given under **A. officinarum,** it would seem, should be reduced to one place under the name of **A. Khulanjan,** *Moodeen Sheriff.* The difference between the rhizomes of the Madras plant and the imported Chinese specimens might easily be due to the former being cultivated in India. **Dr. Moodeen Sheriff's** description is scarcely a botanical one, but the honour of associating his name with this plant would be a deserved recognition of his distinguished labours in the field of economic science. I have left the information given, however, under the two names until it can be ascertained whether the Madras garden plant is in reality the Chinese species described by **Hance** or not. (*Compare with Hanbury's "Science Papers," p. 373.*)

Alpinia nutans, *Roscoe.* 860

LIGHT GALANGAL.

Vern.—*Punag-champa,* BENG.; *Kasta-serambet,* PERS.; *Pa-ga-gyis,* BURM.

Habitat.—A native of the Eastern Archipelago, found also in Burma, Sylhet, and on the Coromandel Coast; much cultivated in Indian gardens.

Botanic Diagnosis.—"*Leaves* lanceolar, short-petioled, smooth. *Racemes* compound, by the lower pedicels being two or three-flowered, drooping. *Lip* (the labellum) broad three-lobed, the lateral lobes incurved into a tube, the exterior curled and bifid. *Capsule* spherical, opening on the sides. *Seeds* few." (*Roxb., Fl. Ind., Ed. C.B.C., p. 22.*)

Medicine.—The rhizome is often used as a substitute for **A. Galanga,** and even as a substitute for ginger. It is much larger than the large galangal and not so pungent. MEDICINE. Rhizome. 861

A. officinarum, *Hance.* 862

THE LESSER GALANGAL; ALPINIA CHINENSIS of Chemists.

Vern.—This is the article which is most frequently sold in the bazars under the names of *kulinján* and *kolijána,* or *pán-ki-jer* or *chandápushpi. Chhota-pan-ki-jar, chota* or *choti-kulijan,* HIND., BENG., and BOMB.; *Shitta-rattai,* TAM.; *Chhóté-pán-ki-jor,* or *kálé-pán-ki-jor,* DUK.; *Sanna-elumparásh trakam,* TEL.; *Khúlanján,* ARAB.; *Khusro-dáru,* PERS.

Habitat—The root-stock is a native of China, and is largely exported to Europe and India.

Botanic Diagnosis.—*Leaves* 9-14 inches long, narrowly lanceolate, much attenuated at the apex, leathery, bright green; *ligule* oblong, subacute, decurrent at the base, and along the margin of the sheath. *Flowers* sessile, closely packed in an erect, dense, terminal spike; *bracts* three, longer than the flowers, the outer green, the inner white; calyx and corolla finely pubescent. *Labellum* about $\frac{3}{4}$ inch long and broad-ovate, entire, acute or bi-lobed, crispid and denticulate, white striated with dark-red veins which coalesce into a distinct fan-shaped spot near the apex.

Medicine.—This is the Galangal of the European shops. In India it is generally known as the *Pan-ki-jar.* It is stomachic, tonic, used by native practitioners to reduce the quantity of urine in diabetes. Is said to correct foul breath when chewed, and the juice swallowed is reputed to arrest irritation in the throat. It is considered a nervine tonic and an aphrodisiac. MEDICINE. The Rhizome. 863

The botanical source of this plant—the true or officinal Galangal—was determined in 1870 by **Dr. Hance,** who published an account of it in the *Journal Linn. Society, 1873, Vol. XIII., 6.* (Compare with **A. Khulanjan.**) Although a native of China, it has been imported into India and used by the Hindú and Mohammedan physicians from time immemorial. **Meer Muhammad Hussain** says that if given to infants it makes them talk early, and that a paste of the powdered drug made with oil or water will remove freckles. "Galangal is one of the ingredients of *Warburg's Tincture.* It is not used in English medicine, but there is a considerable demand for it in Russia." (*Dymock, Mat. Med., W. Ind., 637.*)

D. Hanbury (*Linn. Soc. Journ., 1871, and in his "Science Papers," p. 373*) says: "As a medicine, the manifold virtues formerly ascribed to it (the lesser Galangal) must be ignored; the drug is an aromatic stimulant, and might take the place of ginger, as, indeed, it does in some countries. That it is still in use in Europe is evident from the exports from China, and from the considerable parcels offered in the public drug sales of London. The chief consumption, however, is not in

ALPINIA officinarum.

Trade Returns of Galangal.

Flavouring the Liqueur Nastoilla. 864 **Spice.** 865 **Cattle medicine.** 866

England but in Russia. It is there used for a variety of purposes, such as for flavouring the liqueur called Nastoilla. The drug is also employed by brewers, and to impart a pungent flavour to vinegar." "As a popular medicine and spice it is much sold in Livonia, Esthonia, and in Central Russia; and by the Tartars it is taken with tea. It is also in requisition in Russia as a cattle medicine; and all over Europe there is a small consumption of it in regular medicine."

In concluding his interesting paper upon this drug, **Hanbury** says: "According to **Roudot**, writing in 1848, the trade in this drug is on the decline; and the statistics which I have examined tend strongly to show that this is the fact." The foregoing notes may thus be summarized:—

"1. Galangal was noticed by the Arab geographer, **Ibu Khurdadbah,** in the ninth century, as a production of the region which exports musk, camphor, and aloes-wood.

"2. It was used by the Arabians and later Greek physicians, and was known in Northern Europe in the twelfth century.

"3. It was imported during the thirteenth century with other eastern spices by way of Aden, the Red Sea, and Egypt, to Akka, in Syria, whence it was carried to other ports of the Mediterranean.

"4. Two forms of the drug were noticed by **Garcia de Orta** in 1563; these are still found in commerce, and are derived respectively from **Alpinia Galanga,** *Willd.*, and **A. officinarum,** *Hance.*

"5. Galangal is still used throughout Europe, but is consumed most largely in Russia. It is also used in India, and is shipped to ports in the Persian Gulf and Red Sea."

867

Galangal (Foreign Trade by Sea).

Years.	Imports.		Exports and Re-exports.	
	Quantity.	Value.	Quantity.	Value.
	Cwt.	R	Cwt.	R
1879-80	3,129	25,503	1,817	17,668
1880-81	2,289	19,603	815	7,960
1881-82	3,813	29,625	1,971	15,986
1882-83	3,354	30,952	1,164	10,146
1883-84	3,870	35,982	1,670	13,306

Detail of Imports, 1883-48.

Province into which imported.	Quantity.	Value.	Countries whence imported.	Quantity.	Value.
	Cwt.	R		Cwt.	R
Bengal	686	7,831	China—Hong-Kong	1,230	10,741
Bombay	1,750	14,897	Straits Settlements	2,540	24,446
Madras	1,434	13,254	Other Countries	100	795
Total	3,870	35,982	Total	3,870	35,982

Detail of Exports, 1883-84.

Province whence exported.	Quantity.	Value.	Countries to which exported.	Quantity.	Value.
	Cwt.	R		Cwt.	R
Bengal . . .	51	339	United Kingdom .	480	3,840
Bombay . .	1,544	12,596	Arabia . . .	397	3,736
Madras . . .	75	371	Persia . . .	249	1,471
			Other Countries .	544	4,259
TOTAL .	1,670	13,306	TOTAL .	1,670	13,306

Note.—It is impossible to say how far these trade returns refer to the Greater and Lesser Galangal respectively.

ALSEODAPHNE, *Nees;* PERSEA, *Gærtn., in Gen. Pl., III., 157.* 868

Alseodaphne, ? sp.; LAURINEÆ.

Vern.—*Dowki poma,* ASS.

Habitat.—A tree met with in Assam.

Structure of the Wood.—Soft, red, even-grained. TIMBER. 869

Used for boats, furniture, and building.

ALSTONIA, *R. Br.; Gen. Pl., II., 705.* 870

A genus of trees or shrubs belonging to the APOCYNACEÆ (the Dogbane family), in the tribe CERBEREÆ. There are about 30 species in the genus, inhabitants of tropical Asia, the Malaya, and Australia.

Leaves 3-4-nately whorled, rarely opposite. *Calyx* short, 5-lobed or partite, glandular within. *Corolla* salver-shaped; *throat* naked, annulate or with reflexed hairs; *lobes* overlapping to right or left. *Stamens* near the top of the tube included; *anthers* subacute. *Carpels* two, distinct. *Follicles* 2-linear; seeds many and many-seriate in each carpel, oblong flattened, peltately attached, often ciliate (or comose) on both ends; *cotyledons* oblong flat; *radicle* superior.

The generic name is in honour of **Alston,** once Professor of Botany, Edinburgh.

Alstonia scholaris, *R. Br.; Fl. Br. Ind., III., 642.* 871

Commercially known as DITA BARK.

Vern.—*Chatwan, chhatin, chatiun,* BENG.; *Satiún, chatiún, satwin, satni,* HIND.; *Sapta-parna,* SANS.; *Chhatnia,* URIYA, SANTAL, and MAL. (S. P.); *Chatin, bomudu,* KÓL.; *Chatiwan,* NEPAL; *Purbo,* LEPCHA; *Satiana, chatian,* ASS.; *Satvin,* BOMB., MAR.; *Sattni,* CACHAR; *Eshilaip-pálai, wodrase,* TAM.; *Edakula-pála pala-garuda, édákula-ariti, édá-kula-ponna,* TEL.; *Mukampala, pála,* MAL.; *Janthalla,* KAN.; *Rúk-attana,* SINGH. *Chaile, chalain,* MAGH.; *Let-top, toungmayobeng,* BURM.

Dr. Rice thinks that *Sapta chhada* and *Sapta parna* (seven-leaf) are ancient Sanskrit names for this tree. **Dr. Moodeen Sheriff** says the Singhalese name *rúk-attana* is sometimes given to it; *attana* is, however, the name for Datura. **Dr. Trimen** informs me, however, that *rúk*-attana is the correct Singhalese name for this tree.

Habitat.—A tall, evergreen tree, widely cultivated throughout India,

The Dita Bark.

and found in the Sub-Himálayan tract from the Jumna eastward, ascending to 3,000 feet; in Bengal, Burma, and South India. Distributed to Java, Tropical Africa, and Eastern Australia. An exceedingly useful as it is a highly ornamental tree.

Botanic Diagnosis.—*Leaves* 4-7 in a whorl, ovate or elliptic oblong, white beneath, 4 to 8 by 1 to 2½ inches, nerves 30-60 pairs joining an intramarginal one, base acute, tip obtuse or obtusely acuminate; *cymes* peduncled or sessile, umbellately branched or capitate; *corolla* white, pubescent, throat villous, lobes rounded. *Follicles* very long and slender.

Properties and Uses—

Caoutchouc 872

Caoutchouc.—It yields an inferior quality of Caoutchouc or Gutta-percha, the *Gutta-pulei* of Singapore, which see under **Caoutchouc.**

MEDICINE. The Bark. 873

Medicine.—The bark is used medicinally as an astringent tonic, anthelmintic, alterative, and antiperiodic. It is a valuable remedy in chronic diarrhœa and the advanced stages of dysentery. It is also useful in catarrhal fever. The milky juice is applied to ulcers, and, mixed with oil, is put into the ear in earache. It has also been found most useful in restoring the tone of the stomach in debility or after fever. *Ditain*, the uncrystallizable substance obtained from the bark, is reported to be equal in efficacy to the best sulphate of quinine, while being free from the disagreeable secondary symptoms of that drug.

Description of the Bark.—The drug consists of irregular fragments of bark ⅛ to ⅓ inch thick, easily breaking with a short fracture. The external layer fissured, dark grey or brownish, sometimes with black spots: it readily separates when handled. Inner substance of a bright buff. It has no smell, is bitter but not disagreeable when chewed. (*Official Report of the Bombay Committee regarding a future edition of the Pharmacopœia of India.*)

Officinal Preparations and Dose.—*Preparations.*—An infusion, a tincture and the dry powdered bark, also the active principle *Ditain.*

Doses.—Of the powder 3-5 grains combined with ipecacuanha and with the infusion of gentian used for bowel complaints. Of the infusion 1-2 ounces; of the tincture 1-2 drachms. The active principle may be given in from 5-10 grain doses, repeated every 3-4 hours, not exceeding 1 drachm daily.

DITAIN. 874

Chemical Composition.—§ "The bark of **A. scholaris** has been frequently examined. **Gruppe**, an apothecary of Manilla, separated an uncrystallizable bitter principle which he called *Ditain*, and to which he ascribed the febrifuge properties of the drug. **Sorup-Bosanerj** obtained from ditain a crystallizable substance, which possessed all the properties of an alkaloid. The bark was next examined by **J. Jobst** and **O. Hesse**, who isolated the following: an alkaloid, *Ditamia*, another substance the nature of which as an alkaloid was not clearly established, a crystallizable acid, as well as a fatty acid, and fatty resinous substances. The fatty resins have been named *Echicaoutchin*, *Echicerin*, *Echitin*, or *Echitein* and *Echiretin*, and a fifth resin not fully investigated. **Hesse**, continuing his investigations, subsequently discovered two other alkaloids, in addition to *Ditamine*, i.e., *Echitamine* and *Echitenine*.

"The **A. constricta**, an Australian species, and the **A. spectabilis**, or *poclé* bark of Java, have also been examined by **Hesse**. From the bark of the first-mentioned variety he isolated *Alstonine* or *Chlorogenine*, *Porphyrine*, *Porphyrosine*, and *Alstonidine*. The alkaloids contained in *poclé* bark are thus present in the **A. scholaris**, together with a fourth, *Alstonidine*. In a report on the Centennial Exhibitions, presented to the American Pharmaceutical Association, 1877, it is stated that equal doses of ditain from the **A. scholaris** and sulphate of quinine have the same medicinal effects, while the disagreeable secondary symptoms

which so frequently follow the administration of a large dose of quinine are absent.

"The results arrived at in the Manilla hospitals and in private practice with ditain are described as simply marvellous. The report further adds that in military hospitals and in penitentiary practice (*Manilla*) ditain has perfectly superseded quinine, and is now being largely employed with most satisfactory results in the Island of Mindanso, where malignant fevers are prevalent." (*Surgeon Warden, Professor of Chemistry, Calcutta.*)

Special Opinions.—§ "The tender leaves, roasted and pulverised and made into poultices, act as a useful local stimulant to unhealthy ulcers with foul discharges." (*Surgeon-Major D. R. Thompson, Madras.*)

Structure of the Wood.—White, soft, even-grained; seasons badly, and soon gets mouldy and discoloured. It is not durable, but is easily worked. Weight about 28 lbs. per cubic foot. **TIMBER. 875**

It is used for boxes, furniture, scabbards, coffins, &c. In Burma it is made into blackboards, and in Darjeeling, Assam, and Cachar is occasionally used for tea-boxes. **Boxes and Furniture. 876**

ALTERNANTHERA.

Alternanthera sessilis, *R. Br.;* AMARANTACEÆ (which see). **877**

Vern.—*Mokú-nú-wanna,* SINGH.

Food.—Dr. Trimen writes me that this is largely eaten in Ceylon as a vegetable, especially by mothers to increase the flow of milk; also used as a wash for the eyes. **FOOD. 878**

ALTHÆA, *Linn.; Gen. Pl., I., 200.* **879**

A genus of sub-bushy, herbaceous, erect, or procumbent plants, belonging to the Natural Order MALVACEÆ, inhabitants of the temperate regions: 12 known species.

Althæa, classical Latin name for the Marsh Mallow; ἀλθαία, Gr.

Althæa officinalis, *Linn.; Fl. Br. Ind., I., 9.;* MALVACEÆ.

THE MARSH MALLOW, *Eng.;* GUIMAUVE, *Fr.;* ALTHIEWUREL EIBISCHWURZEL, EIBISCH, *Germ.;* ALTEA, *It.;* ALTEA MALVA VISCO, *Sp.* **880**

Vern.—*Gul-khairo, Khitmi-ká-jhár, khaira-ka-jhor,* PERS., HIND., DUK., and BOMB.; *Gulkhair,* MAR., GUJ., and CUTCH; *Shémai-tutti,* TAM. The fruits are *Tukm-i-khitmi,* PERS. and BOMB.; the roots *Résha-i-khitmi,* PERS. and BOMB.

Habitat.—A native of Kashmír and the Panjáb Himálaya.

Dye.—Often cultivated in Indian gardens for its flowers, rarely for its dye,—a rich blue, obtained from the leaves. **A. rosea,** *Linn,* the HOLLYHOCK, yields the dye even more freely than **A. officinalis,** *L.;* it is met with plentifully in Kashmír. **DYE. 881**

Information as to whether this dye is actually prepared in India would be exceedingly interesting.

Medicine.—This plant was held in great esteem by the Greeks and Latins for its healing properties. The Mohammedans also describe it as a suppurative and emollient; they use the leaves in the form of poultice. The leaves and flowers mixed with oil form an application to burns and venomous bites. A decoction of the root with sugar is given in cough and irritation of the intestines and bladder. (*Dymock.*) **MEDICINE. Leaves. 882 Flowers. 883 Root. 884**

§ "The juice of the leaves, boiled to a proper consistence with castor oil in equal parts, is given internally in parasitic affections of the skin." (*Surgeon-Major R. Thompson, M.D., Madras.*) "The boiled leaves are in common use in Ceylon as a local application to sprains, bruises, and other injuries." (*Surgeon W. H. Morgan, Cochin.*) "The boiled leaves are used as an emollient and suppurative by native hakims." (*Honorary Surgeon Easton Alfred Morris, Negapatam.*) "An excellent application for ulcers." (*Surgeon W. Barren, Bhuj, Cutch.*) "Is not known to the inhabitants of Kashmír as medicinal, but I have there used the leaves in a poultice. Very common in the Sind Valley near streams. (*Surgeon George Cumberland Ross, Delhi.*) "The leaves are useful as a fomentation to relieve pain and itching." (*Surgeon-Major Henry David Cook, Calicut, Malabar.*)

"The powdered seeds are employed in cases of gravel from the kidneys. Chewing the leaves is said to allay thirst. Root-bark acts as a purgative and is used in colic. An infusion of root-barks has also been used as an eye-wash with success. Seeds dissolved in vinegar are employed generally to remove toothache." (*Assistant Surgeon Gholam Nabi.*)

FOOD. 885 **Food.**—Is used as a green vegetable.

886 **Althæa rosea,** *L.; Fl. Br. Ind., I., 319.*

THE ENGLISH HOLLY-HOCK, *Eng.*; GUIMAUVE, *Fr.*

Habitat.—Largely cultivated in Indian gardens, flourishing freely at all hill stations; it probably bears the same vernacular names as have been given above for the MALLOW.

MEDICINE. Seeds. 887 Flowers. 888 Roots. 889 Leaves. 890

Medicine.—The SEEDS of this plant are demulcent, diuretic, and febrifuge. The FLOWERS have cooling and diuretic properties. The ROOTS are supposed to be astringent and demulcent, and are much used in France to form demulcent drinks. Boiled with sugar they yield a decoction largely used in India in the treatment of coughs and irritable conditions of the intestines and bladder. (*Dymock.*) The LEAVES are used as a poultice or fomentation, and, mixed with oil, are applied to burns or sores caused by snake-bites.

§ "**Althæa officinalis** and **A. rosea** are cultivated in many gardens in Madras for medicinal and ornamental purposes. The fresh petioles, stems, and roots of both plants yield a mucilage when bruised, broken and shaken in water. The mucilage is cooling, demulcent, and a very useful adjunct to other medicines in dysentery. In mild cases it is sufficient by itself to relieve some dysenteric symptoms, as tormina and tenesmus. Dose of the mucilage, from one ounce to two ounces. If used alone it should be repeated frequently. (*Honorary Surgeon Moodeen Sheriff, Khan Bahadur, Madras.*)

891 **ALTINGIA,** *Noronha; Gen. Pl., I., 669.*

A genus of trees, containing only 2 species (belonging to the Natural Order HAMAMELIDEÆ).

Leaves alternate, persistent petioled, ovate or oblong, glandularly serrate; *stipules* deciduous or persistent. *Flowers* in dense heads: heads enclosed by a large bract, males racemose, females solitary. *Male* heads a mass of stamens with very short filaments; *anthers* obverse-pyramidal, the valves when young thrown inwards so as to become pseudo-4-celled, dehiscing longitudinally. *Female* heads of 12-20 flowers. *Calyx* confluent, teeth absent, but with rudimentary anthers inserted on the rim. *Ovary* ½ inferior, 2-celled; *carpels* prolonged into 2 distinct deciduous styles; *ovules* numerous on an axile placenta. *Fruiting-head* globose, harsh, many-capsuled; *seeds* imperfect, the lowest winged and fertile, the upper without wings and sterile.

The genus is named after the botanist **Altingia**; there is only one species met with in India :—

Altingia excelsa, *Noronha; Fl. Br. Ind., II., 429.* 892

Syn.—LIQUIDAMBER ALTINGIA, *Bl.*

Vern.—*Siláras,* HIND. and DUK.; *Jutili,* ASS.; *Méaahe-sáyelah,* ARAB.; *Aslelubni,* PERS.; *Neriuriship-pál,* TAM.; *Shilá-rasam,* TEL.; *Rasa-mála,* MAL.; *Siláras,* GUJ.; *Shiláras,* MAR.; *Nan-ta-yok* or *nan-ta-yu,* BURM.

Habitat.—A magnificent tree of the tropical evergreen forests of the Indian Archipelago, Burma, Assam, and Bhután; abundant in the Tenasserim Province of Burma.

Gum.—In Java it yields in small quantity an odorous resin, known in Europe under the name *Storax,* which is obtained by incisions in the trunk; the tree is not regularly cultivated. In Burma, it is said (in the *Pharmacographia*) to afford a fragrant balsam of two varieties: one pellucid and of a light-yellowish colour, obtained by simple incision; and the other, dark, opaque, and of a terebinthinous odour, procured by boring the stem and applying fire around the trunk.

RESIN. Storax. Pellucid form. 893
Opaque form. 894

Medicine.—Yields a form of the resin known in Europe under the name "Storax." For medicinal properties see **Liquidamber orientalis,** *Miller.*

MEDICINE. Storax. 895

§ "In orchitis a very thin layer of storax is laid on a tobacco leaf and applied to the inflamed part." (*Surgeon Joseph Parker, Poona.*)

Structure of the Wood.—Soft, reddish-grey with lighter streaks. Annual rings marked by a narrow belt of firm wood without pores. Weight 46 lbs. per cubic foot.

TIMBER. 896

Used in Assam for building and ordinary domestic purposes.

ALUMEN.

Alumen or **Alum.** 897

Vern.—*Phitkari,* HIND.; *Phatkiri,* BENG.; *Sphatikari,* SANS.; *Shib, sáj,* ARAB.; *Zák, sáke-safed,* PERS.; *Phatki, turti, patakri,* MAR.; *Pati-káram,* TAM.; *Pati-kárám,* TEL.; *Patik-káram,* MAL.; *Keo-khin* or *kyankchin,* BURM.

Preparation of Indian Alum.—Alum is prepared from alum shale in Behar, in Cutch, and in the Panjáb. It is often met with in different shades of colour—white, yellow, red, and black, depending upon impurities.

In the *Bombay Gazetteer, Vol. V., pp. 19-20,* is given an interesting account of the manufacture of alum in Cutch. It is said to have been carried on for the past two or three centuries. During certain months of the year a large quantity of alum is made at Madh. The material used is pyritous dark-grey or black shale, closely associated with a soft aluminous pseudo-breccia of the sub-nummulitic group. This appears to overlie or enclose the shale or to have invaded it. The native burrowings give a poor chance of studying the relations of the rocks; the air in them is exceedingly bad and it is difficult to obtain light, and much of the ground may have been disturbed by "*old men's*" workings, which, according to **Colonel Grant,** fall in every year. Each work is entered by a narrow passage, the sides cut vertically, the floor sloping. About 20 feet below the surface the open air passage stops, and an underground gallery, about 6 feet high and from 3 to 4 feet wide, slopes down to the alum bed, through which, owing to the accumulation of water, no passage has ever been driven.

Cutch Shale. 898

ALUMEN. Alum.

Alum Seed. 899 The alum earth is dug out and exposed for months in heaps. It is then spread in squares and sprinkled with water. After about 12 days it consolidates into efflorescing and mamillated crystalline plates of sulphate of alumina, called alum seed, *phatakarí-ká-bín* or *turi*. These plates are boiled in water mixed with salt-potash in the proportion of 15 parts of the sulphate of alumina to six of the salt-potash. Before the salt-potash has time to dissolve, the fluid is ladled into small earthen vessels, crystallization taking place in less than two days. These crystals are

Alum Matka. 900 again boiled to concentrate the solution, which is finally ladled into large bladder-shaped earthen jars, *matkás*, sunk in the ground to prevent breaking. The alum in each jar forms a solid crystal in about four days.

Cutch Alum. 901 In 1867 the yearly outturn of Cutch alum was estimated at about 294 tons. But after 1867, owing partly to an idea that Cutch alum tinges cloth, and partly because the working of the mines was a mismanaged monopoly, the demand for Cutch alum almost entirely ceased. The Bombay Chemical Examiner analysed Cutch alum in 1878, and according to him it is better than either English or Chinese alum, as the Cutch alum contains only 13 per cent. of impurities and 10·73 per cent. of alumina, being 0·12 per cent. less than the theoretic quantity. The Cutch State has lately discontinued the monopoly of the mines and begun to sell the alum on its own account.

Sind Alum. 902 **Irvine**, in his *General and Medical Topography of Ajmere*, published in 1841, says that alum "comes from Sind, where it is made: about 300 camel-loads annually arrive: red alum is brought from Lahore: used in medicine as an astringent; but chiefly employed in dyeing: one maund for R10."

Panjab Alum Kalabagh. 903 **Baden Powell**, in his *Panjáb Products*, says that "European alum is white and pure, and is on that account preferred to Indian alum in medicine. Bituminous shale, yielding more or less alum, is abundant, all through the Salt-range in the Panjáb, although the manufacture is confined to two places—Kálábagh and Kutki. The alum made at Kálábagh is always of a pinkish colour, due to the presence of chloride of iron. It is remarkable that the alkaline base of Kálábagh alum is soda, while that of English alum is potash. The shale strata at Kálábagh are nearly 200 feet thick. The shale is very soft, and contains a large amount of iron pyrites in crystalline nodules. The red mound-like alum kilns form a striking feature at Kálábagh. In making an alum kiln, layers of brushwood, generally "jhau" or "pilchi" (*Tamarix*) are spread on the ground; then a layer of alum shale is laid upon them, then more brushwood, and so on, the half-formed pile is lighted first, and subsequently more layers of shale and brushwood are added, till the pile reaches a height of 20 to 60 feet. A pile takes 6 or 8 months to burn. The calcined shale is next lixiviated with water in large tanks of baked earth about 12 feet square and 18 inches deep. The liquid is after some time allowed to flow off into a similar tank at a lower level, where it deposits by subsidence its mud and impurities, and is again drawn off into a third vat. It is then poured into iron eva-

Jamsan Salt. 904 porating pans and mixed with a dirty-looking salt, called "*jamsan*," which appears to be similar to the saline efflorescence of *reh* lands, and consists of sulphate of soda with a little common salt, and a very little carbonate of soda. The alkali contained in *jamsan* converts the solution into the alum of commerce. When the mixture has settled, the solution appears as a clear brown fluid, and is drawn off to be evaporated in vats under a shade, where the alum is formed in crystals of a pink colour. These crystals are next washed slightly with cold water on strainers of "*sirki*" grass, after which they are liquified by heat in iron pans. The liquid is poured into earthen jars, where it again crystallizes. The

contents of the jar, broken into lumps, form the alum of commerce. The manufacture appears to have been carried on at Kálábagh for many generations.

Kutki. 905 "The alum works at Kutki across the Chichalli range is of much more recent date than at Kálábagh. The cost of manufacture at Kutki is less than at Kálábagh, owing to the shale being cheaper and the fees lower at the former place.

"There is no difference in the quality of the alum produced at Kálábagh and at Kutki, but the value of Kálábagh alum is R3-4 a maund on the spot, while Kutki alum sells at R2-8. About 12,000 maunds of alum are made annually at Kálábagh, and 10,000 maunds at Kutki. It is exported to all parts of India." (*Baden Powell, Panjáb Products, Vol. I., p. 84.*)

Burma Shale. 906 § "According to **Dr. Brandis,** alum can be obtained from shale which exists in abundance in the Shwegyin district in Burma." (*J. C. Hardinge, Esq., Secy., Agri.-Horticultural Society, Rangoon.*)

Burma Alum. 907

MORDANT. 908 **Mordant.**—It has been found difficult to obtain any very definite information regarding the Indian trade in this valuable salt. **Mr. E.C. Buck** says it is imported into the North-West Provinces from Calcutta, and is much used as a mordant in dyeing, especially with madder and turmeric. Potash-alum is largely imported into Bombay from Europe. (*Dymock.*)

MEDICINE. 909 **Medicine.**—In the *Indian Pharmacopœia* this substance has been described as astringent, styptic, and antiseptic. Used internally in passive hæmorrhages, atonic diarrhœa, infantile cholera, catarrhal affections of the stomach, colica pictonum, whooping-cough, and bronchorrhœa; in the form of lotion or powder, as a local application for catarrhal ophthalmia, granular eyelids, and many other diseases of the eye, in leucorrhœa, gonorrhœa, menorrhagia, prolapsus of the uterus and rectum, and ulcerations. Burnt powdered alum is used as a snuff to stop bleeding from the nose.

Chemical Note.—"The officinal alum of the *Indian Pharmacopœia* is a double sulphate of alumina and ammonia. Several other alums are known, of different bases, such as potash, soda, iron, &c., replacing ammonia in the salt. It is probable that the burnt alum which so frequently enters into native doctors' nostrums is often useless from too high a temperature having been employed in its preparation. Above 400° Farh., alum is decomposed—inert and insoluble alumina remaining." (*Surgeon C. J. H. Warden, Professor of Chemistry, Calcutta.*)

Special Opinions.—§ "It is useful in aphthæ, ulcerated sore-throat, spongy gums, salivation, chronic ulcers." (*Brigade Surgeon J. H. Thornton, B.A., M.B., Monghyr.*) "It has been recommended as useful in relieving the pain caused by a carious tooth." (*Surgeon G. F. Poynder, Roorkee.*) "The domestic use of alum is to clear water. It is a strong cement when liquified by boiling." (*Assistant Surgeon T. N. Ghose, Meerut.*) "It is used as a gargle in relaxed and inflamed throat." (*Brigade Surgeon G. A. Watson, Allahabad.*) "Burnt alum is sometimes very effective as an external application to scorpion-bite." (*Surgeon Joseph Parker, M.D., Poona.*) "If, after the umbilical cord has dropped off, there be any ulceration of the navel, a little burnt alum sprinkled over the part will effect a speedy cure." (*Surgeon W. Wilson, Bogra.*)

"Found beneficial in early abortions, where a difficulty exists to extract the debris; it also lessens hœmorrhage. Should be used in the following manner: finely-powdered alum placed in a muslin bag (the size of a walnut or large-sized marble), with a long thread attached to hang out of the passage. This is introduced into the vagina as far as the os uteri and left there for 24 hours. Should no irritation be felt, the bag can

MEDICINE. be left for another 24 hours, after which, in its removal, the debris will be found lying in the passage and can easily be removed." (*Honorary Surgeon Peter Anderson, Guntur, Madras Presidency.*) "This and the decoction of babúl bark is useful in dysentery, used as injection." (*Surgeon-Major P. N. Mukerji, Cuttack, Orissa.*) "A piece of alum burnt and applied to the part stung by a scorpion allays the pain rapidly. Burnt alum mixed with lime-juice is a useful remedy in ophthalmia." (*Surgeon-Major John Lancaster, Chittore.*) "Alum is one of the best remedies for whooping-cough, but it seems to have gone out of use lately. For this purpose, it should be given in doses of from 10 to 20 grains three times a day." (*Surgeon-General William Robert Cornish, F.R.L.S., Madras.*) "Useful in doses of 5 grains in diarrhœa and latter stage of dysentery combined with opium. Useful astringent lotion in conjunctivitis and purulent ophthalmia (alum 4 grains, rose-water one ounce); also in gonorrhœa and gleet." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*)

910 **ALYSICARPUS,** *Neck.; Gen. Pl., I., 522.*

A genus of annual or biennial spreading or erect herbs, comprising about 15 species (belonging to the Natural Order LEGUMINOSÆ).

Leaves simple, rarely 3-foliolate, stipulate, subcoriaceous. *Flowers* in copious axillary racemes. *Calyx* glumaceous; *teeth* deep, often imbricated, the two upper frequently connate. *Corolla*, not exserted; *standard* broad; *keel* obtuse, adhering to the wings. *Stamens* diadelphous; *anthers* uniform. *Ovary* nearly or quite sessile, many-ovuled; *style* incurved; *stigma* capitate. *Pod* terete or turgid, composed of several indehiscent 1-seeded joints.

911 **Alysicarpus vaginalis,** *DC., var.* **ummularifolius**; *Fl. Br. Ind., II. 158.*

Vern.—*Nág bala* (*Stewart's Pb. Pl.* 57). **Sakhárám Arjun** says that in Bombay *Nág bal* is the name for SIDA ALBA.

Habitat.—Himálaya to Malacca and Ceylon, ascending to 4,000 feet in the North-West Provinces.

MEDICINE. 912 **Medicine.**—This may be the officinal plant referred to by some authors; information very imperfect.

913 **AMARANTACEÆ.**

A Natural Order of herbaceous or suffruticose, glabrous, pubescent, or woolly plants; erect, sparely branched or scandent. *Leaves* opposite or alternate, simple, usually entire, membranous or fleshy, exstipulate. *Flowers* small, scarious, diclinous or hermaphrodite, rarely polygamous, sessile, solitary or in glomerulate heads or spikes, the lateral ones sometimes arrested or developed only into crests, awns, or hooked hairs. *Bracts* three, the lateral smaller, often keeled, the central and lowest large, sometimes leafy. *Calyx* 4-5, sepals (in Mengea) distinct or coherent at the base, erect, equal or sub-equal (2-3 interior sepals smaller), green, scarious, rarely petaloid, persistent, imbricate in æstivation. *Corolla* wanting. *Stamens* hypogynous, inserted at the base of the sepals, 1-5, fertile, included or early exserted, opposite the sepals (rarely fewer), with or without alternate staminodes, all free or united below, forming a cup or tube; *filaments* filiform, subulate or dilated, sometimes 3-fid; *staminodes* entire or fringed flat or rarely concave, sometimes very small and toothed; anthers introrse 1-2 celled, dorsifixed, dehiscing longitudinally. *Ovary* free, ovoid or globose compressed, rarely depressed, 1-carpelled and 1-celled; *style* terminal, simple, sometimes obsolete; *stigma* capitate-emarginate, or two or more lobed or 2-3-fid. *Ovule* solitary, erect or suspended from an ascending funiculus. *Fruit* usually enveloped in the calyx, sometimes membranous, a 2- or more-seeded utricle, bursting by circumsciss dehiscence or irregu-

larly, rarely a berry. Seeds usually compressed, reniform, testa crustaceous, black, shining; *hilum* naked or early arillate, albumen abundant. *Embryo* peripheric, annular or curved; *cotyledons* incumbent, radicle near the hilum, inferior or sub-ascending.

Affinities of the Order.—The Amarantaceæ have their closest affinity with the Chenopodiaceæ, the latter differing chiefly in habit, and in having distinct styles and a herbaceous calyx.

Its Habitat.—There are 480 species, in the whole world, referred to this Natural Order, and they are mostly tropical or extra-tropical plants, taking the place in the tropics of the Chenopodiaceæ, which extend into the temperate regions. In India there are a little over 80 species, chiefly extra-tropical, or if met with in the tropical regions they are annuals, which appear, or are cultivated in the plains, during the cold season only. A few species are strictly tropical, and these, compensating for the sparsity of forms, make up in abundance of individuals, since they are perhaps the most plentiful weeds on roadsides and waste places met with in the plains of India. The Indian species are referred to 15 genera; of these the genus Amarantus contains 27 species, and 17 occur in Ærua and Achyranthes,—two genera, the species of which are undoubtedly the most typical and prevalent Indian representatives of the order. It is not far from correct to say that the Amarantaceæ attain their maximum development in the tropical regions of the New World, the greatest number of species perhaps occurring in Mexico. There are few species in the temperate zones, and none in cold countries, some 5 or 6 species only being met with in Europe.

DeCandolle (in *L'Orig. des Pl. Cult.*) very truly remarks that all the species of Amarantus spread themselves on cultivated lands, among rubbish-heaps and on roadsides, and have thus naturalised themselves in most warm countries as well as in Europe; hence great difficulty exists in distinguishing the species, and above all in guessing or proving their origin.

The following brief classification of the Indian genera may be found useful; it will at least serve to direct attention to the respective alphabetical positions where fuller details will be found regarding the more important members of this order. It is necessary to explain, however, that the information given is of the most meagre kind, since there is perhaps no family of Indian economics regarding which greater confusion exists. Most writers give the information published by them under vernacular names only, and the few authors who do associate these vernacular names with the scientific names for the plants referred to, are unfortunately most conflicting in their statements, so that it has been found next to impossible to arrive at any satisfactory conclusion. It is hoped that this confession, which must of necessity run through the greater portion of the present work, but which is specially true with regard to the Amarantaceæ, may call forth new material, based upon the present attempt at grouping scientifically the available economic information. For museum purposes it is absolutely necessary that all collections of Amarantaceous food-stuffs or drugs be accompanied with dried specimens of the plants from which they are obtained, together with the various vernacular names given to these plants. Were such collections to be made by the local authorities there would then be no difficulty in having the present confusion regarding the Amarantaceæ completely removed, and this much-to-be-desired result would, without doubt, prove most convenient and valuable both to the cultivator of the soil and to the administrator, since, in times of scarcity and famine, few sources of food are more valuable than the various forms of Amarantaceous grains. They reach maturity in little more than two months, and require scarcely any rain, so that they often succeed when other crops fail. That confusion and ambiguity should exist in official

correspondence regarding plants of such importance to India is much to be regretted. The conflicting opinions in vernacular and botanic names applied to the species of economic interest render it impossible to do more than indicate the probable species to which the Indian forms belong, and it is difficult, from available literature, to arrive at any conclusion regarding the vernacular which should be associated with the scientific names. For example, it may be mentioned that in the Introduction to Part I. of **Duthie** and **Fuller's** *Field and Garden Crops, p. v.*, in a list of crops are found the words "*ramdana* (**Amarantus frutescens**)." What is **Amarantus frutescens**? **DeCandolle** gives it as a synonym for **Iresine amarantoides**, a plant apparently not met with in India, while **Moquin** places it under "*Species non satis notæ.*" According to **Duthie and Fuller**, it is one of the *rabi* crops of the North-West Provinces.

914 CLASSIFICATION OF THE INDIAN AMARANTACEÆ.

[NOTE.—*Fuller details of the genera marked * will be found in their respective alphabetical positions.*]

TRIBE I.—CELOSIEÆ.

Anthers 2-locular. *Ovary* 2, many-ovuled. *Leaves* alternate.

SECTION 1ST.—*Fruit a berry, perianth spreading, stalked.*

1. Deeringia.—Flowers racemose.

This genus is now made to include the species formerly referred to **Deeringia** and **Cladostachys**. The following are the commoner species:—

D. baccata, *Moquin; Wight, Ic., t. 728.*

Syn.—D. INDICA, *Spreng.*; D. CELOSIOIDES, *R.Br.*; *Roxb., Fl. Ind., Ed. C.B.C., 229.*

Vern.—*Latman*, HIND.; *Gola-mohaní*, BENG.

Habitat.—An extensive climber, very common in Bengal, covering the *babúl* trees with its racemes of small scarlet berries, which ripen from December to January. Apparently not put to any economic use.

D. muricata, formerly **Cladostachys muricata,** *Moquin,* and **Achyranthes muricata,** *Linn.*

D. tetragyna, *Roxb.; Wight, Ic., t. 729.*

SECTION 2ND.—*Fruit membranous, perianth erect.*

2.* Celosia.—Filaments connate at the base, fruit bursting by circumsciss dehiscence.

TRIBE II.—AMARANTEÆ.

Anthers 2-locular. *Ovary* 1-ovuled.

Sub-tribe I. EUAMARANTEÆ.—Ovule erect, funicle short, radicle inferior. Leaves alternate.

SECTION 1ST.—*Flowers hermaphrodite or diœcious. Perianth segments spreading in fruit.*

3. Rodetia.—Flowers 2-4—bracteolate.

SECTION 2ND.—*Flowers hermaphrodite. Perianth segments erect in fruit.*

4. **Banalia.**—Flowers in panicled spikes. Stigma 2. Fruit membranous indehiscent. Arillus absent.

B. thrysiflora, *Moquin,* a native of the Nilgiri Hills. **Achyranthes thrysiflora,** *Wall.* A herbaceous climber.

5. **Allmania.**—Herbaceous plants. Flowers capitate. Stigma capitate. Fruit bursting by circumsciss dehiscence. Seed arillate. The following are the principal Indian species :—

A. esculenta, *R.Br.*, Singapore.

A. nodiflora, *R.Br.*, Coromandel.

6.* **Digera.**—Herbs. Flowers spicate. Stigma 2-fid. Nut crustaceous.

Section 3rd.—*Flowers unisexual. Perianth segments erect in fruit.*

7.* **Amarantus.**—Flowers most frequently monœcious. Fruit various.

This genus is now made to include the species formerly referred to the following genera : **Amarantus, Amblogyne, Mengea,** and **Euxolus.**

Sub-tribe II. Achyrantheæ.—Ovule suspended from the apex of an elongated funiculus. Fruit indehiscent. Seed inverted; radicle ascending or superior.

Section 4th.—*Flowers hermaphrodite, 1-3 perfect and bracteate, the others imperfect and stipulate.*

8. **Cyathula.**—Flowers forming fascicled or capitate spikes. Staminodes or teeth ascending from the connate base of the filaments Leaves opposite. The following are the principal Indian species :—

C. capitata, *Moquin.*

C. prostrata, *Blume ; Wight,Ic., t. 733 ; Roxb.,Fl.Ind., Ed.C.B.C.,226.*

C. tomentosa, *Moquin.*

9. **Pupalia.**—Flowers forming simple or panicled spikes perfect flowers solitary amongst the imperfect ones. Staminodes absent. Leaves opposite. The following are the Indian species :—

P. atropurpurea, *Moquin ; Wight, Ic., t., 731.*

Vern.—*Duiya-khuiya,* Beng.

P. lappacea, *Moquin.*

P. velutina, *Moquin.*

Section 5th.—*Flowers hermaphrodite, solitary, 2-bracteolate. Interfilamentary teeth absent.*

10. **Psilotrichum.**—Exterior segments of the perianth thick, 3-costate. Herbs or under-shrubs with opposite leaves and dense-flowered axillary spikes. The following are the Indian species :—

P. ferrugineum, *Moquin (? Endl.) ; Wight, Ic., t. 721 ;* Achyranthes ferruginea, *Roxb., Ind. Ed., Wall.*

P. nudum, *Moquin.*

P. trichotomum, *Blume.*

11. **Ptilotus.**—Perianth segments free, thin, transparent. Leaves alternate.

12.* Ærua.—Perianth segments hairy. Teeth short. Herbs or under-shrubs (lanate), leaves opposite or alternate.

13.* Achyranthes.—Perianth, after flowering, deflexed, segments and bracts spinescent. Herbs with opposite leaves, flowers in long lax spikes. This genus is now made to include **Achyranthes** and **Centrostachys.**

TRIBE III.—GOMPHRENEÆ.

Anthers 1-locular. *Ovule* suspended from the apex of a prolonged funiculus which ascends from the base of 1-celled ovary. *Leaves* generally opposite.

SECTION 1ST.—*Stigma simple, capitate.*

14. Alternanthera.—Flowers hermaphrodite, capitate, axillary, rarely terminal, solitary or 2-5. Staminal tube nearly as long as the ovary; stamens 3 (rarely 5); staminodia nearly as long as the filaments. Ovary orbicular compressed. (*See page 199.*)

The above definition has been restricted to the characters of the Indian representatives of the genus, which form a small section or sub-genus by themselves.

A. denticulata, *R. Br.*

A. nodiflora, *R. Br.; DC. Prod., XIII., 2nd, 356; Thw. En. Cyl. Pl., 350.*

A. sessilis, *R. Br.; Wight, Ic., t. 727.*

Syn.—GOMPHRENA SESSILIS, *Linn.;* ALTERNANTHERA TRIANDRA, *Lam.;* ACHYRANTHES TRIANDRA, *Roxb.; Fl. Ind., Ed. C.B.C., 227.*

Vern.—*Shanchi,* BENG.; *Mokú-nú-wanna,* SINGH.

SECTION 2ND.—*Stigma 2-subulate or filiform.*

15. Gomphrena.—*Perianth* often softly hairy or lanate, segments free or united at the base. *Staminal tube* elongated, antheriferous teeth 5. *Inflorescence* capitulate or hemispheric; *bracts* lateral, concave, fleshy, crested on the back. Under-shrubs with opposite generally semi-amplexicaul leaves.

G. globosa, *Linn.*

THE GLOBE AMARANT.

Common in Indian gardens. There are two varieties—*Lal-gúl-makmal,* BENG., or the crimson form; and *Safed-gúl-makmal,* the yellowish-white form.

The Globe Amaranth is one of the most prolific and ornamental flowers in the Indian flower garden, largely cultivated by natives. Flowering time the rainy season.

915 **AMARANTUS,** *Linn.; Gen. Pl., III., 28.*

A genus of tropical plants, belonging to the Natural Order AMARANTACEÆ, comprising some 45 species, of which 27 are most probably natives of India.

Leaves alternate, contracted at the base, ovate-lanceolate or linear, entire or rarely sinuate-dentate, apex often mucronate. *Flowers* minute, monœcious or polygamous, bracteate, arranged in dense axillary or terminal panicled spikes. *Perianth* segments 5, rarely 1-3, membranous, equal or sub-equal, in the male ovate-lanceolate, in the female oblong, white or coloured, generally purplish red, thickened at the base, erect in fruit. *Stamens* 5, rarely 1-3, filaments subulate free. *Ovary* ovoid, compressed; *style* short or wanting; *stigmas* 2-3, subulate or filiform and papillose. *Ovary* 1, sub-sessile, erect;

fruit often included by the persistent perianth, orbicular or ovoid, compressed, indehiscent or opening by a circumsciss, membranous, or coriaceous apex, simple or 2-3 dentate.

This genus, according to the *Genera Plantarum*, includes the species formerly referred to **Euxolus, Mengea,** and **Amblogyne,** as well as to **Amarantus** proper.

The generic name is derived from the poetic flower, the Amarant, supposed never to fade. *Amaranth*, Ger.; *Amarante*, Fr.; *Amaranto*, It., Sp., and Port.; *Amarantus*, Lat., and ἀμάραντος, Gr., non-fading (from ἀ and μαραίνω, to quench).

O'Shaughnessy says that nearly all the species of Amarantus "may be used as emollients for enemata, cataplasms, diluents and drinks." These properties doubtless depend upon the amount of nitre which they contain. **Boutin** found that **A. Blitum** yielded for 100 parts of the plant 11·68 grains of nitrate of potash (*Journ. Pharm. and Chem., 4th series*).

The following brief classification of the more important forms of Amarantus met with in India may assist the reader to recognise the species as defined by botanists:—

(A.) *Spikes branched, terminal and axillary. Stamens 5.*

Amarantus Anardana.—Erect-branched. *Leaves* oblong. *Spikes* erect, cylindrical obtuse. *Calyx* shorter than the bracts; sepals oblong-elliptic, mucro-nulate.

A. frumentaceus.—Stems and branches erect. *Leaves* broad lanceolate. *Spikes* adpressed, crowded. *Calyx* longer than the stamens. *Capsule* wrinkled; seeds pellucid with a white margin. (This may prove to be but a form of a **A. paniculatus.**)

A. tristis.—Erect, very much branched near the ground. *Leaves* rhomboid-ovate, obtuse. *Spikes* long erect, sparsely branched, green.

A. spinosus.—Erect, much-branched, with round spikes in the axils. *Spikes* terminal, almost simple, with sessile axillary glomeruli.

A. paniculatus.—Erect-branched. *Panicle* 1-2 feet long, decompoundly branched, crimson. *Leaves* long petioled, broad lanceolate, concave. *Sepals* obtuse, shorter than the capsule.

(B.) *Spikes simple and terminal; axillary ones very short and distant. Stamens 3.*

A. gangeticus.—Erect-branched above the middle. *Leaves* rhomboid-ovate. *Glomerules* axillary or spicate; terminal spikes very often ovate obtuse rigid, axillary glomerules ovate. *Calyx* longer than the slightly rugose capsule and shorter than the bracts.

A. lanceolatus.—Straight, erect. *Leaves* long petioled, lanceolate, tapering at both extremities. *Glomeruli* axillary scarcely spiked. *Calyx* 3-membranous, with green keel. *Anthers* sagittate.

A. oleraceus.—Erect, sparsely branched. *Leaves* broad, rhom-boid-ovate lanceolate. *Calyx* cuspidate, longer than the rugose capsule.

A. mangostanus.—Terminal *spike* oblong or sub-globose, very obtuse sub-flexuose, axillary glomeruli rotund. *Fruit* shorter than the calyx.

A. lividus.—Erect, smooth. *Leaves* long petioled, sub-ovate retuse. *Calyx* 3-5, shorter than the compressed capsule.

A. viridis.—*Leaves* elliptic-emarginate. *Glomeruli* on the ends of axillary twigs. *Sepals* obtuse, much shorter than the rugose capsule.

A. fasciatus.—*Leaves* rhomboid-ovate. *Panicles* terminal, composed of a few cylindrical branches. *Bracts* minute, shorter than the obtuse sepals, which are shorter than the rugose capsule.

Amarantus polygamus.—Diffuse. *Leaves* petioled, rhomboid-emarginate with a bristle. *Glomeruli* rarely spicate. *Calyx* twice the length of the capsule.

A. atropurpureus.—Erect-branched. *Leaves* lanceolate. *Glomeruli* axillary and forming terminal spikes. *Calyx* 3-5, cuspidate, longer than the capsule.

(C.) *Flowers in axillary glomerules, but never forming terminal spikes; stamens 3 or 2.*

A. polygonoides.—A small, diffuse plant. *Leaves* obovate, sub-sessile or petioled. *Glomeruli* axillary, two parted but never spiked. *Capsule* equal or longer than the calyx. *Seeds* black, shining.

A. melancholicus.—Much-branched, 6-12 feet high. *Leaves* rhomboid-ovate. *Calyx* cuspidate, longer than the capsules. *Glomeruli* almost surrounding the stem.

A. tenuifolius.—A diffuse annual with shortly petiolate deltoid leaves. *Male flowers* diandrous, female irregular. *Capsule* with 6 longitudinal furrows.

916 **Amarantus Anardana,** *Hamilt.*; AMARANTACEÆ.

Vern.—*Chúa*, HIND.; *Chuko*, GUJ.; *Ganhár, tawal, chauláí, síl* (seed), PB.

With the exception of *Chúa*, the vernacular names given above are also associated with **A. mangostanus.** It seems probable that the word *Anárdáná* may be applied to the grain obtained from most AMARANTACEÆ.

References.—*DC. Prod. XIII., II., 256; Stewart's Pb. Pl., 181.*

Habitat.—Cultivated in the mountain tracts of Bengal and the Upper Provinces.

From the information available in works on Indian Economic Botany, it is almost impossible to arrive at any conclusion as to the plant which generally bears this name. According to some authors it is only a variety of **A. frumentaceus** (or of a **A. paniculatus**); by others it is viewed as a distinct species. The similarity in vernacular names with those given for **A. mangostanus,** *Linn.*, would lead one to the conclusion that it is nearly related to that plant. **Stewart** combines the names **A. Anardana** and **A. gangeticus** in a common paragraph describing their properties, and it is therefore impossible to separate the vernacular names, or to understand how far his description applies to the one or the other. In the *Prodromus DeCandolle,* **Moquin** seems to regard **A. Anardana** as a better known species than **A. frumentaceus**; but his description of the latter agrees accurately with the plant cultivated on the Himálaya (the *bathú* of Simla), so that it would seem the Himálayan plant should be known as **A. frumentaceus.**

MEDICINE. 917 **Medicine.**—They are used in scrofula and as a local application for scrofulous sores; administered in the form of a liquid.

§ "Astringent in diarrhœa." (*Surgeon Barren, Bhuj, Cutch.*)

FOOD. 918 **Food.**—The leaves are eaten as a pot-herb. The seeds, after being parched, are used in some places as a food-grain, but are considered heating.

919 **A. atropurpureus,** *Roxb.; Fl. Ind., Ed. C.B.C., 662; DC. Prod., XIII., 2, 264.*

Said to be cultivated as a pot-herb in Bengal and to be known as *Lál-nati, kunka-nati,* or *bansh-pata-lál-nati.*

920 **A. Blitum,** *Linn.*

Said to be cultivated in India.

Amarantus caudatus, *Linn.; DC. Prod., XIII., pt. 2, 255.* 921

LOVE LIES BLEEDING, *Eng.*; QUEUE DE RENARD, DISCIPLINE DE RELIGIEUSE, *Fr.*

Vern.—*Kedari chúa,* HIM. NAME (according to **Atkinson**).

Habitat.—Cultivated in gardens throughout India. A well-known plant with drooping tail-like spikes of flowers.

Atkinson says it is cultivated in the hills for local consumption. The seed is sown in May and June, and the crop is ripe in October. This is the only mention of this plant being cultivated as a food-crop. I found one or two plants the other day growing on the border of a field a few miles from Simla. On enquiry it was found the people had no name for it, and they stated that it was an introduced form of *bathú,* which latter they regard as indigenous. This species does not seem to have been introduced into India during **Roxburgh's** time; at all events he does not mention it.

A. farinaceus, *Roxb.; DC. Prod., XIII., pt. 2, 266.*

Medicine.—The plant is said to possess diuretic and purifying properties. MEDICINE. 922

A. fasciatus, *Roxb.; Fl. Ind., Ed. C.B.C., 663; Wight, Ic., t. 717.* 923

Vern.—*Tún-túni-nati, than-nati,* BENG.; *Chilaka-tóta-kúra, chilaka-kúra,* TEL.; *Hilamóchaka,* SANS.

A common green weed (*Roxb.*).

A. flavus, *Linn.; DC. Prod., XIII., 2, 258.* 924

Said to have been collected by **Wallich** in Nepal, where it was cultivated.

A. frumentaceus, *Buch.; Wight, Ic., t. 720.* 925

Syn.—It seems probable that this may be reduced to A. PANICULATUS, *Miq.*; A. SPECIOSUS, *Sims; Bot. Mag., t. 2227.*

Vern.—*Bathu, báthu, batu,* or *bathú,* PB.; *Betu,* KUMAON; *Larka baha,* SANTAL; *Pungi-kirai,* TAM.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 663; DC. Prod., XIII., 2, 265; DC. L'Orig. Pl. Cult.; Atkinson's Him. Districts, 697.*

It seems likely that this is the plant which most generally receives the names *chúa, chúa-mársa, rámdána, anardána.* The name *báthú* is in the plains of India generally applied to **Chenopodium album.**

Habitat.—Cultivated on the Himálaya from Kashmír to Sikkim. **Roxburgh** says it was first discovered by **Dr. Buchanan** on the hills between Mysore and Coimbatore. (Compare with the remarks under **A. Anardana** in explanation of the above region over which this species is cultivated.) **Atkinson** says: "*Chúa* is largely grown in the northern *parganas* up to 9,500 feet, where it forms the staple food of the poorer classes, and is a favourite crop in newly-cleared jungle, as it is not easily injured by bears and deer."

Food.—One of the mosti mportant sources of food to the hill tribes of India. There are two varieties,—a golden-yellow and a red. The former seems to be preferred, since it is more cultivated than the latter; but most fields contain, as a rule, a few red plants here and there amongst the golden-coloured crop. Although, no doubt, the young tops are to a certain extent eaten as a vegetable, most of the hill-men speak of this as only an occasional thing,—the small seed is the product for which it is cultivated. FOOD. 926

Forms of Amarantus in India.

FOOD.

Indeed, from the fact that it rarely branches, it seems probable that the plant would be injured were the young tops or leaves to be lopped as a vegetable. The unbranched habit is, however, the result of thick, broadcast sowings. When grown singly it seems to branch. It is perhaps one of the most elegant crops cultivated by the hill people. When young, the large leaves (seen at a distance) remind the traveller of a turnip-field, but when the terminal golden-yellow or red crowded spikes of flowers appear in the centre of each terminal rosette of leaves, it becomes truly lovely.

Dr. Roxburgh records the following facts: "In the Botanic Garden 40 square yards of ground sown with this plant in June, yielded 21 lbs. weight of the clear ripe seed in September. It also grows well during the cold season, *viz.*, from October till February, inclusive." My friend **Mr. Campbell**, of the Santal Mission, informs me that the plant is sparingly cultivated hy the Santals and eaten as a pot-herb.

Atkinson says: "It is sown in May and June in first and second class unirrigated land, and yields about twenty loads to the acre. The produce of an acre is worth about R16, and the estimated outlay is about half that sum." The yield and the shortness of the period required for the production of this food-supply, seem to justify the opinion already indicated, that this, as also several other species of Amarantus, might with advantage be resorted to, when, through want of rain, scarcity or even famine is threatened.

927 **Amarantus gangeticus,** *Linn.*

Vern.—*Lál-ság,* HIND.; *Ranga-shák, lál-shák, dengua,* BENG.; *Arak, gandhari,* SANTAL; DeCandolle (*in L' Orig. Pl. Cult.*) says that the forms of this plant are called in Telugu *Tóta-kúra,* with an adjective to denote the special form. These are the names that Roxburgh gives to the plant he calls **A. oleraceus,** and it is quite probable that the South Indian forms of *lál-ság* belong to **A. gangeticus.** Until, however, this has been clearly established, it has been thought advisable to leave the Madras plants in the position assigned them by Roxburgh. *Wight, Ic., t. 715,* gives a figure of this species under the name of **A. oleraceus,** *Linn.* See **A. oleraceus.**

In India cultivated as a vegetable. There are a large series of forms of this species varying as to colour and shape of leaf, but referable to two sections—those which may be placed under **A. gangeticus** proper, the *lál-ság,* and those which would more naturally fall under—

928 **Var. angustifolius.**—A. ANGUSTIFOLIUS, *Roxb. Hert.; and* A. LANCEOLATUS, *Roxb., Fl. Ind., Ed. C.B.C., 662; Wight, Ic., n. 716, Ic., t. 713.*

Vern.—*Báns-patá-natiya,* BENG.

References.—*Roxb., Fl. Ind., Ed. C.B.C., 662; DC. Prod.; DC., L'Orig. Pl. Cult.; Stewart, Pb. Pl., 181; U. C. Dutt, Hindú Mat. Med.*

Habitat.—A small annual plant common in Bengal and Assam. **Dr. Roxburgh** says: "The varieties of this useful species cultivated in Bengal alone are endless." "They are in more general use among the natives of Bengal than any other species or variety. The varieties are tolerably permanent, and differ in colour chiefly, which varies from green with the slightest tinge of red, to rufous, liver-coloured, and bright red. One variety has particularly broad leaves, with the margins green, and the centre dark purple." Most probably this species was originally indigenous to India, but it is now extensively cultivated in many parts of the world, and even claimed as a native of Egypt and Abyssinia. From the fact that all the species allied to **A. gangeticus** are indigenous to Asia, it may be presumed that it is a native of India.

Food.—This and **A. frumentaceus** are perhaps the two most important species of Amarantus met with in India. But while the latter is cultivated entirely for its seed, **A. gangeticus** is grown as a green vegetable only. It is extensively cultivated by the natives of Bengal, sown broadcast, under what is commonly known as garden cultivation, by professional vegetable-producers. The plants are pulled up when young and sold in the bazars entire; the leaves and tender stalks are the parts of the *lál-shák* chiefly used; they are made into curry by all classes of natives. Largely cultivated in Chutia Nagpur. **De Candolle** (*L'Orig. Pl. Cult.*) says the young stems are sometimes used as a substitute for asparagus on the English table. He also states that several species of annual Amarantus are cultivated in Mauritius, Bourbon, and Seychelles under the name of Brède de Malabar, of which **A. gangeticus** seems to be the chief species. The Japanese cultivate as a vegetable the variety **melancholicus** amongst many others, such as **A. polystachyus,** *Blume.* FOOD. 929

Medicine.—Used in India in the form of an emollient poultice. MEDICINE. 930

Amarantus hypochondriacus, *Linn.; DC. Prod., XIII., 2, 256.* 931

THE PRINCE'S FEATHER.

An exceedingly handsome annual, common in Indian gardens, the leaves as well as the spikes being of a rich crimson.

"The leaves are said to be astringent, and to be used internally and topically in the complaints to which astringents generally are applicable." (*U. S. Dispens., 15th Ed., 1568.*)

A. lanceolatus, *Roxb.* 932

See **A. gangeticus,** *var.* **angustifolius.** There seems quite as much ground for this being kept up as a distinct species as for any other species; but most authors seem to place it under **gangeticus,** and it has therefore been deemed advisable to adhere for the present to that view.

A. lividus, *Linn.* 933

Syn.—EUXOLUS LIVIDUS, *Moquin; DC. Prod., XIII., 2, 273.*

Vern.—*Gobura-nati,* BENG.

A native of America: cultivated in India.

O'Shaughnessy says it is "held in great esteem by the natives."

A. mangostanus, *L.; DC. Prod., XIII., 2, 261.* 934

Vern.—*Chaulai, ganhar,* UPPER INDIA; *Ság,* BENG. "Ság is a generic name for pot-herbs: *Chouldi* is in South India applied to **Portulaca quadrifolia.**" (*Moodeen Sheriff.*)

Habitat.—Occasionally cultivated in the plains.

Food.—The leaves are used as a pot-herb. FOOD. 935

Medicine.—**Mr. Baden Powell** gives **Amarantus,** sp., *Chuláí* (*p. 425*), amongst his rare medicinal oils. No other mention can be found of this or any other oil made from Amarantus, and the fact is therefore of considerable interest. It would be exceedingly interesting to have fuller particulars, and also samples of the oil, and of the plant from which it is made. The name *chauldi* is applied to this species, as also to at least a half of all the known Amarantuses, and it may be quite wrong to refer this curious oil to **A. mangostanus.** MEDICINE. 936

A. melancholicus, *Linn.; Moquin, DC. Prod., XIII., 2, 262.* 937

Syn.—A. TRICOLOR, *Linn.*

There are numerous cultivated forms of this species, which have received

gardeners' names, many of which are highly ornamental. In *L'Orig. Pl. Cult.*, **DeCandolle** says that the forms of this species should all be referred to **A. gangeticus**. This may be correct, but if so the definition of the species will have to be enlarged, since in inflorescence and number of stamens they do not agree. See classification of species of Amarantus.

938 **Amarantus oleraceus,** *Linn.*

Syn.—EUXOLUS OLERACEUS, *Moquin ; DC. Prod., XIII., 2, 273.*

Vern.—*Sada-natia, natiyá-ság,* BENG. ; *Bháji* and *támbadámáth,* MAR. ; *Tótakúra, erra-tóta-kúra, tella-tóta-kúra* and *pedda-tóta-kúra,* TEL. ; *Tand-kirai, kirai-tand,* TAM. ; *Dat, dant-ké-bháji,* DUK. ; *Dant,* GUJ. AND MAR. ; *Márisha,* SANS. Compare with the note under vernacular names of **A. gangeticus.**

This plant, if it really exists in India, must have been introduced, and the various forms attributed to it seem to take the place in Southern India of **A. gangeticus** in Bengal. The descriptions of these two species as published by **Roxburgh** hardly differ, however, and it seems exceedingly probable that the plants which in India have been called **A. oleraceus** should be referred to **A. gangeticus.** Until this opinion can be clearly established, however, it has been deemed advisable to leave them in the position assigned to them by **Roxburgh.** The following are the forms described by the father of Indian botany :—

"There are several varieties cultivated as pot-herbs over India, particularly on the coast of Coromandel. The most conspicuous after the common green sort are—

" *1st.—Erra-tóta kúra* of the Telingas, a very beautiful variety, with a clear, bright red stem ; branches, petioles, nerves, and veins, and the leaves themselves, rather ferruginous. (*Lál-dat,* Duk.)

" *2nd.—Tella-tóta kúra* of the Telingas ; here all the parts that are red in the last variety are of a clear, shining, white colour. *Saféd-dat,* DUK.)

" *3rd.—Rosa* or *Pedda-tóta kúra* of the Telingas, is a very large variety, which **Konig** called **A. giganteus.** In a rich soil it grows to from 5 to 8 feet high, with a stem as thick as a man's wrist. The tender succulent tops of the stem and branches are sometimes served up on our tables as a substitute for asparagus. (*Gulábí-dat,* DUK.)

"The other varieties are more changeable and not so well marked. I will not therefore take notice of any more of them."

939 **A. paniculatus,** *Miq., var.* **cruentus** ; *DC. Prod., XIII., 2, 257.*

Vern.—*Rajagaro,* GUJ. ; *Táj-e-khurús,* PERS., PESHAWAR ; *Bustán-afróz,* PERS., KASHMIR ; *Rájgirá,* DUK.

Habitat.—Most probably a native of China, cultivated in India.

MEDICINE. 940 **Medicine.**—Used medicinally for purifying the blood and in piles, and as a diuretic in strangury. (*Baden Powell, Pb. Prod., I., 373.*) (See **A. frumentaceus.**)

941 **A. polygamus,** *Linn.*

Syn.—EUXOLUS POLYGAMUS, *Moquin ; DC. Prod., XIII., 2, 272* ; A. POLYGAMUS, *Willd. ; Roxb., Fl. Ind., Ed. C.B.C., 661.*

Vern.—*Chámpá-natiya,* or *lál-chámpá-natiya* (or *nutí*), BENG. ; *Chumli-ság, chowlai-ka-bhaji* (according to **Murray**), (see note under **A. mangostanus**), HIND. ; *Doggali-kúra,* TEL. ; *Tanduliya,* SANS. (according to **U. C. Dutt**).

Cultivated throughout the peninsula of India as a pot-herb. It admits of being freely lopped. **Roxburgh** says both the green and red "sorts are extensively cultivated all over the southern parts of Asia." **Atkinson** says it is a common species grown as a pot-herb along the edges of fields in the sub-montane tracts.

Amarantus polygonoides, *Linn.; Wight, Ic., t. 512.* 942

Syn.—A. POLYGONOIDES, *Willd.; Roxb., Fl. Ind., Ed. C.B.C., 661*; AMBLOGYNA POLYGONOIDES, *Rafin; DC. Prod., XIII., 2, 270? Wight, Ic., t. 719.*

Vern.—*Cherú-natia, chelú-natipa,* BENG.; *Chira kura,* HIND.

Though not cultivated, the natives use it as a pot-herb, as it is considered very wholesome, especially for convalescents. (*Roxburgh; O'Shaughnessy; &c.*)

A. spinosus, *Willd.; DC. Prod., III., 2, 260.* 943

PRICKLY AMARANTH.

Vern.—*Kántá naté* or *kánta nutia, kánta-maris,* BENG.; *Cholái,* ? HIND.; *Janum arak',* SANTAL; *Kánte-mát,* MAR.; *Mulluk-kirai,* TAM.; *Kántá-nu-dánt,* GUJ.; *Mundla-tóta-kura, nalla-doggali, erra-mulu-góranta,* TEL.; *Mullan-chira,* MAL.; *Mulla-dantu, mulharavesoppu,* KAN.; *Tanduliya,* SANS.; *Hinkanoe-súba* or *hinnoe-súbá,* BURM.

Habitat.—Frequent in the plains of India, chiefly in Bengal and Malabar.

Dye.—**Dr. McCann,** in his *Report on the Dye-stuffs of Bengal,* states that in Cuttack the ashes of this plant are used in dyeing with **Mallotus philippinensis.** DYE. 944

Food.—The leaves make a good spinach and pot-herb, though the sharp spines in their axles are troublesome to pick. The poor among the natives use the leaves as pot-herbs, especially in times of scarcity. FOOD. 945

Medicine.—The whole plant is used as an antidote for snake-poison, and the root as a specific for colic. The root has been found useful in the treatment of gonorrhœa: it is said to arrest the discharge. MEDICINE. Root. 946

"The Hindú physicians prescribe the root in combination with other drugs in menorrhagia. A poultice of the leaves was officinal in the Bengal Pharmacopœia." (*Dymock's Mat. Med., W. Ind.*) It is also considered a lactagogue, and, boiled with pulse, is given to cows. Leaves. 947

§ "The root has lately been introduced into European practice as a remedy for gonorrhœa, and is advertised by some of the London druggists." (*Surgeon-Major Dymock.*) "Roots made into poultice are applied to buboes and abscesses for hastening suppuration. (*Surgeon Anund Chunder Mukerji, Noakhally*). "Supposed to be an excellent remedy for gonorrhœa. Dose of the decoction of the root one to two oz." (*Surgeon W. Barren, Bhuj, Cutch.*) "*Kántá nutia* is a cooling diuretic. An infusion in hot water I have used in some cases of gonorrhœa. It lessens burning and relieves pain." (*Surgeon R. L. Dutt, M.D., Pubna.*) Decoction. 948

"Used frequently for colic pain and for scorpion-bite." (*Surgeon C. J. W. Meadows, Burrisal.*) "Emollient and used in the form of poultice." (*Deputy Surgeon-General G. Bidie, Madras.*) "Given to cows as a lactagogue." (*Asst. Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*)

In a recent correspondence, however, with the Government of India in regard to the proposed issue of a revised edition of the *Pharm. Ind.,* the Surgeon-General of Madras expressed the opinion that **A. spinosus** should be excluded from the future edition of that work.

949 **Amarantus tenuifolius,** *Willd.; Wight, Ic., t. 718.*

Syn.—MENGEA TENUIFOLIA, *Moquin; DC. Prod., XIII., 2, 271.*
Vern.—*Ghénti-nati, jélchumli,* BENG.

Cultivated in Bengal in the neighbourhood of Calcutta—a stemless spreading plant (*O'Shaughnessy*).

950 **A. tristis,** *Linn.; Wight, Ic., t. 514 & t. 713.*

Syn.—? A. CAMPESTRIS, *Willd, sp., 382.*
Vern.—*Pond-gandhari,* SANTAL; *Mekanada, ganna,* SANS.; *Churi-ki-bhâji,* DUK.; *Sirru-kirai, kappi-kirri* (**Roxburgh**), *shiru-kirai, kurvi-kirai,* TAM.; *Sirru-kúra, koyya-tóta-kúra,* TEL.
References.—*DC. Prod., XIII., 2, 260; Roxb., Fl. Ind., Ed. C.B.C., 661.*

Habitat.—An erect herb, branching freely even from the ground. There are probably many sub-species met with in cultivation in the plains of India (especially of the south and west portions of the peninsula), of which **A. campestris** is by some authors regarded as a distinct species.

MEDICINE. 951 **Medicine.**—The roots have attributed to them demulcent properties.

FOOD. 952 **Food.**—**Roxburgh** says of this plant: "It is held in great esteem by all ranks of the natives, and is much cultivated by them; it grows readily all the year round if watered." It has "always terminal spikes; besides, it may be cut down several times without destroying the plants, for they soon shoot out vigorously again. This renders it much more useful to the poorer natives, who are possessed of but a very small spot of ground and little time to spare for its culture; besides, it is in higher esteem than **A. oleraceus,** which yields but one crop."

§ "Used also as diuretic in form of a decoction combined with some other medicines." (*Surgeon-Major J. T. Fitzpatrick, M.B., Coimbatore.*)

953 **A. viridis,** *Linn.*

Syn.—EUXOLUS VIRIDIS, *Moquin; DC. Prod., XIII., 2, 273;* A. BLITUM of most authors but not of *Linn.*

Roxburgh says of this plant: "A native of various parts of India, appearing most frequently as a weed in gardens during the rainy and cold seasons. The tender tops are eaten by the natives, though not so much esteemed as the cultivated sorts." (*Fl. Ind., III., 605.*)

AMARYLLIS.

954 **Amaryllis grandiflora,** AMARILLYDEÆ, the *sukhdarsan,* PB., is alluded to by both **Stewart** and **Baden Powell.** It is said to yield a medicinal oil. If this plant has been correctly identified, it can only be cultivated in gardens; its modern name is **Brunsvigia grandiflora. Stewart** says: "A correspondent of the Agri.-Horti. Society states that the strained juice of two drams, reduced to a pulp with water, is a good emetic, and that one drop into the ear will generally cure earache." From the existence of a vernacular name for this plant, however, it seems probable that the authors mentioned above have given incorrectly the name **Amaryllis grandiflora** to some other Amaryllidaceous plant. "*Sukhadarsan* is a well-known Hind. name for a species of **Crinum.**" (*Moodeen Sheriff.*)

AMBER.

955 **Vern.**—*Kahrubá,* HIND., DUK., PERS.; *Inqitriyún, qarnul bahr,* ARAB.; *Ambeng,* BURM.

A fossilised resin, yielded by trees, chiefly pines, (?) which grew during

the cretaceous period of geologists, usually found in connection with tertiary lignites. It is hard, brittle, easily cut, of various shades of yellow, and semi-transparent. It is very useful to the physicist, becoming negatively electric by friction. The amber supply is chiefly from the Baltic region, Samland being the great centre. Crude amber occurs in commerce in irregular pieces. When ground or heated it emits a pleasant odour. It is completely soluble in alkaline solutions containing camphor. On being boiled for 20 hours in rape or linseed oil, it becomes transparent and ductile, and may then be moulded into any desired form. It is chiefly used for ornamental purposes such as necklaces, bracelets, and brooches, for mouth-pieces of pipes and cigar-holders, for the preparation of a varnish, and for the manufacture of amber-oil and succinic acid. See **Varnish** and also **Gum Copal**.

Irvine, in his *Materia Medica of Patna*, says that it is used as an aphrodisiac in native medical practice, and in his *General and Medical Topography of Ajmere* (published in 1841) he says that the natives of Ajmere do not know real amber, but that they use a mixed sort of scent called amber, which is of the consistence of plaster, and seems an imitation of ambergris. It is chiefly used as an aphrodisiac, and costs R5 to R6 a tolah.

AMBERGRIS. 956

Abr-i-amber, *Aanbar*, *anber*, or *araba* of the Indian bazars, is produced from ambergris. "Ambergris is found in pieces floating in the sea near the coasts of India, Africa, and Brazil; it is of an ash-grey colour, spotted like marble with black spots; but it appears to vary considerably in colour, some pieces being white, some black, and some grey with yellow spots. It is very light and easily takes fire. It is most probably a concretion formed in the stomach or intestines of the spermaceti whale, *Physeter macrocephalus*. Several specimens have been found full of the embedded beaks of a species of sepia which is the food of the *Physeter*: it is supposed by some to be formed only during disease, as the specimens of the whales in the stomach of which ambergris was found were sickly." (*Baden Powell, Panjáb Products, Vol. I., p. 190.*) **Dr. Irvine** says that ambergris is brought from Singapore. It is used as an aphrodisiac. It costs R80 a ℔. *Mat. Med., Patna, p. 10.*)

"Ambergris has a peculiar aromatic, agreeable odour, is almost completely volatilizable by heat, and is inflammable. It is insoluble in water, but is readily dissolved, with the aid of heat, by alcohol, ether, and the volatile and fixed oils. It consists chiefly of a peculiar fatty matter analogous to cholesterin and denominated by **Pelletier** and **Caventou** *ambrein*. This may be obtained by treating ambergris with heated alcohol; filtering the solution and allowing it to stand, crystals of amberin are deposited. It is incapable of forming soaps with alkalies. When pure it has little or no odour." (*U. S. Disp., 15th Ed., 1568.*)

Amblogina polygonoides, *Rafin.*; Syn. for **Amarantus polygonoides**, AMARANTACEÆ, which see.

AMMANNIA, *Linn.; Gen. Pl., I., 776.* 957

A genus of annual glabrous herbs, belonging to the Natural Order LYTHRACEÆ. *Stems* square; *leaves* opposite and alternate, sometimes whorled, entire; *stipules* wanting. *Flowers* small, axillary, solitary and sub-sessile, or in small trichotomous cymes; bracteoles usually 2. *Calyx* membranous, campanulate or tubular-campanulate 3-5-toothed, often with minute teeth or folds. *Petals* 3-5 or 0, small, inserted between the calyx-teeth. *Stamens* 2-8, inserted on the calyx-tube. *Ovary* enclosed in the calyx-tube, 1-5-celled, the septa often

absorbed ; *style* filiform or short ; *stigma* capitate ; *ovules* many ; *placentas* axile. *Capsule* membranous, dehiscing irregularly or by a circumsciss. *Seeds* many.

A genus of sub-aquatic herbs, named after **John Ammann**, Professor of Botany, St. Petersburgh.

958 **Ammannia baccifera,** *Linn.; Fl. Br. Ind., II., 569.*

BLISTERING AMMANIA.

Syn.—A. VESICATORIA, *Roxb.*

Vern.—*Dád-mári*, HIND.; *Ban-marach, dádmári*, BENG.; *Banmarich, agin-búti, guren, bhár jambol, agiya*, BOMB., DUK.; *Kallu rivi, nirumél-neruppu*, TAM.; *Agnivenda-páku*, TEL.; *Kallúrvanchi*, MAL.

Dr. Sakhárám Arjun says that in Bombay the *dád-mári* is **Cassia Tora.**

Habitat.—A small, herbaceous plant, generally met with on wet places throughout India, and extending to Afghánistan and China.

Botanic Diagnosis.—Cauline *leaves* opposite or alternate, oblong or narrow-elliptic, tapering to the base. *Flowers* in dense clusters forming knots on the stem, or in looser but very short axillary *cymes. Capsule* globose.

MEDICINE. 959 **Medicine.**—**Dr. Roxburgh** says: "It has a strong muriatic but not disagreeable smell. Its leaves are exceedingly acrid; they are used universally by the natives to raise blisters in rheumatic pains, fevers, &c. The fresh leaves, bruised and applied to the part intended to be blistered, perform their office in the course of half an hour or a little more, and most effectually." **O'Shaughnessy** says: "We made trial of this article in eight instances; blisters were not produced in less than 12 hours in any, and in three individuals not for 24 hours. The bruised leaves had been removed from all after half an hour. The pain occasioned was absolutely agonising until the blister rose. We should not be justified in recommending these leaves for further trial; they cause more pain than cantharides, and are far inferior to the plumbago (*lál chitrá*) in celerity and certainty of action." "The juice of the plant is given internally in spleen; but it causes great pain, and the result is not certain." (*Amster. Desc. Cat.*) In a recent correspondence with the Government of India about the revision of the *Pharmacopœia of India*, the Surgeon-General of Madras recommended that the **Ammannia baccifera** should be excluded from a future edition of the work.

§ "I find that an etherial tincture blisters well, without more pain than Liquor Lythæ." (*Surgeon-Major Dymock, Bombay.*) "As a blister it is much more painful than cantharides." (*Deputy Surgeon-General G. Bidie, Madras.*) "The bruised fresh leaves are applied as a poultice to abscesses, and the juice of the root is used in rheumatic affections as a topical application." (*Honorary Surgeon P. Kinsley, Ganjam, Madras.*) "The leaves are used as a vesicant." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*)

960 **A. senegalensis,** *Lamk.; Fl. Br. Ind., II., 570.*

Vern.—*Faugli mehndi, dádmári*, PB.

Habitat.—Grows in wet places in the plains of the Panjáb and of the North-West Provinces, ascending to 5,000 feet in altitude.

Botanic Diagnosis.—*Leaves* opposite, elongate-oblong, sessile, sub-auriculate at the base. *Cymes* peduncled compound. *Capsule* $\frac{1}{14}$ in. diameter, globose.

MEDICINE. 961 **Medicine.**—Used as a blistering agent.

A. vescicatoria, *Roxb.;* Syn. for **A. baccifera,** *Linn.*, which see.

Ammoniacum, see **Dorema Ammoniacum,** *Don;* UMBELLIFERÆ.

AMMONIUM.

Ammonium chloride. 962

SAL AMMONIAC, *Eng.;* HYDROCHLORATE D'AMMONIAC, *Fr.;* SALMIAK, *Germ.*

Vern.—*Nousádar,* HIND.; *Nishedal, nóshágar,* BENG.; *Navsár, navaságar,* GUJ.; *Navságar,* MAR.; *Navá-sagara,* KAN.; *Nava-charum, navách-chárum,* TAM.; *Navá-ságaram, navá-chárum,* TEL.; *Navásáram,* MAL.; *Milhunnár, arminá,* ARAB.; *Nóshádar,* PERS.; *Giatsah,* BHOTE; *Navácháram,* CINGH.; *Zarasa, dza-wet-tha,* BURM.

This substance is largely manufactured in the Panjáb and used in tinning and forging metals, in the formation of freezing mixtures, and also in the separation of ammonia.

Baden Powell gives an interesting account of the manufacture of sal ammoniac in the Panjáb. He states that sal ammoniac has been, for ages, largely manufactured by the potters (*Kúmhárs*) of the Kurnál district, chiefly in the village of Gumtallah. The process of the manufacture, which is similar to the Egyptian method, is as follows: From 15,000 to 20,000 bricks, made of the dirty clay to be found in certain ponds, are put all round the outside of a brick-kiln, which is then heated. When these bricks are half burnt, there exudes from them a substance of a greyish colour which resembles the bark of a tree. This substance is of two sorts: (*a*) an inferior kind, called the *mittíkhám* of *naushádar,* produced at the rate of 20 to 30 maunds for each kiln, and sells at 8 annas a maund; (*b*) the superior kind called *papri,* of which not more than 1 or 2 maunds is obtained from each kiln, and sells at R2 to 2½ a maund. Merchants who deal in sal ammoniac buy both sorts. The *khám mittí* is passed through a sieve, and then dissolved in water and allowed to crystallize, the solution being repeated four times to clear away all impurities The pure substance that remains is then boiled for nine hours, to allow the liquid to evaporate, and the resulting salt has the appearance of raw sugar. The *pápri* is next taken and pounded, after which it is mixed with the first preparation. The whole is put in a large pear-shaped vessel made of thin black-coloured glass, having a neck 2½ feet long and 9 inches round. The vessel is closed at the mouth, or, more properly speaking, the vessel has no mouth,—the composition being inserted by breaking a hole in the body of the vessel near the neck. This hole is eventually closed by placing a piece of glass over it. The vessel is then coated over with seven successive coatings of clay. It is placed in a large earthen pan filled with *nausádar* refuse to keep it firm. The neck of the vessel is further enveloped in a glass cover and plastered with fourteen different coatings of clay to exclude all air. When thus arranged it is placed over a furnace kept burning for three days and three nights, the cover being removed once every twelve hours to insert fresh *nausádar* so as to supply the place of what has been sublimed. After three days and three nights the vessel is taken off the furnace, and when cool the neck is broken off, and the rest of the vessel calcined. A substance called *phálí* is produced by the sublimation of the salt from the body of the vessel into the hollow neck. There are two kinds of *phálí;* the superior kind is that produced after the *nausádar* has been on the fire for only two days and two nights, in which case the neck is only partially filled with the substance and the yield is about 5 or 6 seers. This is sold at the rate of R16 a maund. The inferior kind is produced by the *nausádar* being kept on the fire three days and three nights; the neck of the

vessel is completely filled with *phálí* when it yields 10 or 12 seers, and the salt is sold at R13 a maund.

"That portion of the sublimed *nausádar* which is formed in the mouth, and not in the neck of the vessel, is distinctively called *phúl*, and not *phálí*; it is used in the preparation of *surma*, and is esteemed of great value, selling at R40 a maund. The production of *nausádar* in brick-kilns is probably owing to the decomposition of watery vapours by the red-hot bricks in presence of the nitrogen of air and of common salt. The amount of sal ammoniac manufactured in the Kurnál district is estimated at 2,300 maunds, valued at R34,500. The merchants buy it on the spot from the manufacturers on an average at R8 a maund, who export it to Bhawani, Dehli, Farakabad, Mirzapur in the North-Western Provinces, and to Firozpur and Amritsar in the Panjáb, and who also sell it at R15 a maund. "It is also occasionally extracted from brick-kilns in other districts of the Panjáb than Kurnál, but in small quantities. It is found in Europe near burning beds of coal, in England and Scotland, and also near the volcanoes of Vesuvius, Etna, &c."

"It is used as a freezing mixture with nitre and water, and in the arts in tinning and soldering metals, and in the operation of forging the compound iron used for making gun-barrels by native smiths. (*Baden Powell, Panjáb Products, I., pp. 89, 90.*)

MEDICINE. 963 **Medicine.**—In medicine it is prescribed in inflammation of the liver and spleen. According to **Dr. Irvine**, it is not used internally in native practice. (*Mat. Med., Patna, p. 74.*)

§ "Dissolved in oil or yolk of eggs, it is used as a local application in cases of leucoderma." (*Assistant Surgeon Gholam Nabi.*) "Used largely in congested liver, in bronchitis, and in glandular enlargement as an external application." (*Assistant Surgeon Nehal Sing, Saharunpore.*) "Useful in guinea-worm, both internally and externally." (*Surgeon-Major G. Y. Hunter, Karachi.*) "Largely imported into Bombay from Europe." (*Surgeon-Major Dymock, Bombay.*) "An excellent remedy in affections of the bronchial tubes. Relieves hemicrania if given in 10 or 20 grain doses." (*Surgeon-Major W. Barren, Bhuj, Cutch, Bombay.*) "Useful in neuralgic headache in doses of 20 grains. I have used it largely in chronic diseases of the liver with benefit. As obtained in the bazar it is very impure and should be recrystallized." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*) "It is useful when ammonia is not procurable. This and quicklime can be procured in any bazar, and in cases of sudden fainting or hysterical fits mix the two in a phial; with gentle heat ammonia will be given off." (*Surgeon K. D. Ghose, Khulna.*) "Invaluable in neuralgia, 20-grain doses every 3 hours; relief after 3 doses or not at all; also in laryngeal cough or spray. In catarrh of Bhyondic and of the urinary tract, in whooping-cough, migraine." (*By a Surgeon who has not signed his contributions.*) "Mixed with *kalakootkee* (**Helleborus niger**) and softened with water, applied to the temple and forehead in the form of a paste in cases of hemicrania." (*Assistant Surgeon Anund Chunder Mukerji, Noakhally.*) "In 10-grain doses 3 or 4 times a day, I have found the medicine to be of the greatest use as an alterative in different affections of the liver." (*Assistant Surgeon Doyal Chunder Shome, Calcutta.*)

964

AMOMUM, *Linn.; Gen. Pl., III., 644.*

A genus of herbaceous plants belonging to the Natural Order SCITAMINEÆ, and the Tribe ZINGIBEREÆ, comprising some 50 species, chiefly inhabiting the tropical regions of Asia and Africa, a few extending to Australia and the Pacific Islands.

Root-stock horizontal, thick or elongated, rooting. *Leafy branches*

ascending from the ground, destitute of flowers. *Leaves* lanceolate, spreading distichously, sessile sheathing. *Scape* short-oblong, crowded spike with the flowers expanding spirally (strobuliferous), or elongated, leafless, with a few scales, ascending in spring from the rhizome, very rarely terminating the leafy branches (compare with inflorescence in **Alpinia**); *bracts* imbricate, solitary or 2-3 flowered. *Calyx* tubular, dilated upwards (spathaceous) obliquely 3-fid, the posterior sepal very much larger than the others. *Corolla-tube* most frequently exceeding the calyx; limb 3-lobed, equal and prominent or the posterior very much larger, erect and hooded, the lateral ones long, narrow, spreading. *Stamens* theoretically 6, in two series; *the outer* petaloid, of which the two posterior are reduced to two small awn-shaped teeth, inserted upon the mouth of the corolla-tube, and the anterior one developed into a large labillum or spreading lip, entire and undulated on the margin or more or less trilobed, convolute at the sheathing base. *Filament* of the fertile stamen short, ascending from the mouth of the corolla, posterior and within the erect-hooded petal; *connective* more or less dilated, concave, upon which the two large diverging anthers are inserted, prolonged beyond into a small appendage which may be entire or variously cut or produced into a crest, entire or trilobed and often highly coloured. *Ovary* inferior 3-locular, many-ovuled; *style* thin, prolonged behind the anther-cells; *stigma* subglobose, fitting into the space formed through the anthers diverging upward. *Fruit* globose or oblong, embraced by the fleshy receptacle, pericarp fleshy rough or echinate, indehiscent or bursting irregularly or into 3 valves. *Seeds* many, globose or obovoid-truncate.

A genus closely allied to **Alpinia**, differing chiefly in the habit and *inflorescence, and in the diverging anther-cells, and the prolonged or* crested connective.

Amomum aromaticum, *Roxb.*; SCITAMINEÆ. 965

THE AROMATIC CARDAMOM PLANT.

Vern.—*Mórang-iláchi*, BENG. and HIND.; *Veldode*, MAR.

Habitat.—" A native of the villages on the eastern frontier of Bengal." (*Roxb.*)

Medicine.—The *Pharmacopœia of India* refers the Greater Cardamom to this plant, following apparently an error which exists in all the earlier works on Indian Economic Science. **Mr. Hanbury** made the same mistake. See **A. subulatum.** MEDICINE. 966

"The fruit ripens in September; the capsules are then carefully gathered by the natives, and sold to the druggists, who dispose of them for medicinal and other purposes, where such spices are wanted, under the name of *mórang-iláchí* or *cardamom*, though the seed-vessels of this species differs in form from all hitherto-described sorts of this drug; however, the seeds are similar in their shape and spicy flavour." (*Roxburgh.*)

Apparently this fruit is not now used, or there was some mistake on the part of **Dr. Roxburgh** as to this being the Greater Cardamom of Bengal. He does not call it by the name of Greater Cardamom; but the plant which is sold and used at the present day as the Greater Cardamom of Bengal, and presumably the *mórang-iláchí* of **Roxburgh**, has been identified as the fruit of **A. subulatum.**

§ "Astringent and tonic, used as a tooth-powder; and said to be a good dentifrice." (*Surgeon John McConaghey, M.D., Shahjehanpore.*)

A. dealbatum, *Roxb.* 967

Habitat.—A native of Eastern Bengal and the adjoining frontier; a stately species, flowering in March and April, and ripening its insipid seed in September and October.

Food.—According to **Mr. Baden Powell** (*Pb. Prod.*, *380*), this is the species which yields the Cardamom, the *Iláchí bari* or *kalán* of the FOOD. 968

Panjáb bazars. He says of it: "Said to be more powerful than the smaller kind, but to resemble it in other respects. An agreeable aromatic stimulant." It seems probable that this is a pure case of mistaken identity, and that the above quotation should be referred to **A. subulatum.**

969 **A. masticatorium,** *Thw.; En. Cy. Pl., 317.*

Habitat.—Common in the forests of the central provinces of Ceylon up to an elevation of 4,000 feet.

FOOD. 970 **Food.**—The Singhalese chew the rhizomes of this plant with their betel.

971 **A. maximum,** *Roxb.*

Habitat.—A native of Java. This was supposed by **Dr. Pareira** to be the Greater Cardamom of Bengal. **Dr. Roxburgh** says it was introduced into Bengal from the Malay Islands by the late **Colonel Kyd.**

FOOD. 972 **Food.**—The flowering time is the hot season, and the seeds ripen three or four months afterwards; they possess a warm pungent taste somewhat like that of Cardamoms, but by no means so grateful. (*Roxburgh.*)

973 **A. Melegueta,** *Roscoe.*

Habitat.—Cultivated to a small extent in Indian gardens. A native of, and widely distributed in, West Tropical Africa, extending from Sierra Léon to the Congo.

FOOD. 974 **Food.**—Grains of Paradise or Melegueta Pepper are the produce of this species. They are carminative, aromatic, and are used to flavour cordials, and to give false strength to beer and other liquors.

MEDICINE. 975 **Medicine.**—They are also used in cattle medicines. (*Smith; Pharmacographia; Bent. & Trim.*) About 1,000 cwt. are annually exported to Great Britain from the Gold Coast, which is chiefly consumed in the preparation of cattle medicine.

§ "Used commonly as carminative." (*Nehal Sing, Saharunpore.*)

976 **Amomum subulatum,** *Roxb.*

THE GREATER CARDAMOM.

Vern.—*Bari-iláchi,* HIND.; *Bara-eláchi,* BENG.; *Elachi, elcho, moto-iláchi,* GUJ.; *Bari-iláyechi,* DUK.; *Moté-veldode,* MAR.; *Periya-yélak-káy, káttu-yelak-káy,* TAM.; *Pedda-yéla-káyalu, adaviyéla-káya,* TEL.; *Doddá-yalakki,* KAN.; *Pérélam, periya-elattari,* MAL.; *Brihat-upakun-chiká, ela,* SANS.; *Qákilhahe-kibár, hél-sakar,* ARAB.; *Qákilahe-kalán, qáqilahe-sakar,* PERS.; *Ben, pala,* BURM.

The meaning of almost all the vernacular synonyms is, according to Moodeen Sheriff, the *Larger Cardamom.* The Greater Cardamom is most readily obtained in Calcutta, Hyderabad, Bombay, and other places under the Arabic name *Qákilahe-kibár*; in Madras it is to be had under the names *Jangli-ilichi,* DUK.; *Kattu-elakkáy,* TAM.; and *Adavi-éla-káya,* TEL.;—all signifying the wild Cardamom.

Habitat.—A native of Nepal.

The Greater Cardamom has a fruit about the size of a nutmeg, irregularly obcordate, flattened antero-posteriorly, having 15 to 20 irregular dentate-undulate wings, which extend from the apex downwards for two-thirds of the length of the Cardamom. **Dr. King,** in the *Linnæan Journal, Vol. XVII., p. 3* (reproduced in *Kew Report, 1877, p. 27*), clearly showed that the larger Cardamoms were the produce of this species and not of **A. aromaticum,** *Roxb.,* to which plant **Dr. Roxburgh** attributed them, but he presumes that it may be possible the latter plant was used in **Roxburgh's** time, though out of use now.

Medicine.—The seeds yield a medicinal oil. It is an agreeable, aromatic stimulant, pale yellow in colour, having the odour and flavour of the seeds. The seeds are aromatic and camphoraceous. Medicinal properties will be found under the true cardamom, *i.e.*, **Elettaria Cardamomum**, for which the greater cardamom is used as a cheap substitute. MEDICINE. Oil. 977 Seeds. 978

Food.—The greater cardamoms are much used in the preparation of sweetmeats on account of their cheapness. FOOD. 979

The **Opinions** of medical officers received, appear chiefly to refer to the true cardamom, although communicated under this species.

§ "Used as a carminative and stomachic." (*Assistant Surgeon Jaswant Rai, Mooltan.*) "It acts as a stomachic, and is said to allay irritability of the stomach produced either by cholera or some other affections. The decoction of cardamom is used as a gargle in affection of the teeth and gums. In combination with the seeds of melons it is used as a diuretic in cases of gravel of the kidneys." (*Assistant Surgeon Gholam Nabi.*) "Invaluable in certain disorders of the digestive system, marked by scanty and viscid secretion from the intestines, promotes elimination of bile, and is useful in congestion of the liver." (*Surgeon J. Maitland, M.B., Madras.*) "Very useful in liver affections, especially where abscess threatens; dose x grains. (*Surgeon-Major C. R. G. Parker, Pallaveram, Madras.*) "I have found it most useful in neuralgia in large doses, 30 grains, in conjunction with quinine. It is also a useful carminative in dyspepsia and diarrhœa." (*Surgeon-Major Henry David Cook, Calicut, Malabar.*) "Used in gonorrhœa as an aphrodisiac." (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*)

Amomum xanthioides, *Wall.* 980

Vern.—§ "The seeds, *Iláyechi-dáné*, HIND. and DUK.; *Elam*, TAM.; *Elakulu*, TEL.

Habitat.—§ "The seeds (not entire capsules) are imported from China and Singapore, and met with in every large bazar of South India.

Description.—"They are angular and very irregular seeds, generally inclining to be triangular, and sometimes compressed or flat; smaller in size than the common cardamom seeds, colour pale brown; odour strongly aromatic and agreeable, and taste aromatic and slightly pungent. Although the smell and taste of these seeds are stronger than those of the common or Malabar cardamom (**Elettaria Cardamomum**), yet they are more agreeable; and there is the same difference between the tinctures prepared from these drugs.

Medicine.—"The seeds are stimulant and carminative, and are useful in all the affections in which the common cardamoms are indicated. They are also of great service in relieving tormina and tenesmus, and even frequency of motions, in some cases of dysentery, and for this purpose they must always be used in powder with butter. They are administered in simple powder and compound tincture, the latter being prepared in the same way as the Tincture Cardamom Co. of the Pharmacopœia of India. Dose of the powder, from 20 to 40 grains, and of the tincture, from ʒi to ʒii." (*Moodeen Sheriff, Khan Bahadur, Madras.*) MEDICINE. 981

AMOORA, *Roxb.; Gen. Pl., I., 334.* 982

A genus of trees belonging to the Natural Order MELIACEÆ, comprising some 15 species, inhabitants of the tropical and extra-tropical regions of Asia and Australia; 12 occurring in India, and 1 being endemic to Australia.

Leaves usually unequally pinnate; *leaflets* oblique, quite entire. *Inflorescence* subdiœcious, paniculate, female spicate or racemose. *Calyx* 3-5-partite or -fid. *Petals* 3-5, thick, concave, imbricated, rarely slightly combined at the base. *Staminal* tube sub-globose or campanulate, inconspicuously 6-10

crenate; *anthers* 6-10 included. *Disk* obsolete. *Ovary* sessile, short 3-5-celled; cells 1-2-ovuled. *Stigma* sessile or style elongated. *Capsule* sub-globose, coriaceous, 3-4-celled and seeded, loculicidally 3-5-valved. *Seeds* with a fleshy aril; *hilum* ventral.

The generic name is derived from the Bengali vernacular name *Amúr*.

983 **Amoora cucullata,** *Roxb.; Fl. Br. Ind., I., 560.*

Syn.—ANDERSONIA CUCULLATA, *Roxb.; Fl. Ind., Ed. C.B.C., 310.*
Vern.—*Amúr, latmi, natmi,* BENG.; *Thitnee,* BURM.

Habitat.—A moderate-sized, evergreen tree, met with on the coasts of Bengal and Burma: in Nepal and in the Andaman Islands.

Botanic Diagnosis.—A large tree of slow growth with cinereous bark; sub-glabrous, *leaflets* 3-13, opposite or sub-opposite, obliquely-oblong, obtuse at both ends, terminal one often hooded at the apex. *Flowers* panicled, not spicate; males drooping, about as long as the leaves, with numerous diverging branches, sparingly lepidote; female racemes few-flowered. *Petals* 3. *Anthers* 6-8. *Style* short, ovary 3-celled, cells 2-ovuled. *Fruit* sub-globose, 3-lobed, 3-celled, and 3-valved.

TIMBER. 984 **Structure of the Wood.**—Red, hard, close-grained, but apt to split. Weight 44 lbs. per cubic foot.

DOMESTIC. 985 Used for posts and other purposes in Lower Bengal, and for firewood in the Sundarbans.

986 **A. decandra,** *Hiern.; Fl. Br. Ind., I., 562.*

Vern.—*Tangarúk,* LEPCHA.

Habitat.—A large, spreading tree, found in the Eastern Himálaya, Nepal, Sikkim, from 2,000 to 4,000 feet.

Botanic Diagnosis.—*Leaflets* 7-13, opposite, oblong-acuminate, base somewhat cuneate or nearly rounded, sub-glabrescent and sub-membranous. Male panicles equalling the leaves. *Flowers* fragrant, on slender pedicels. *Sepals* very short. *Petals* 5. *Anthers* 10. *Ovary* 3-5-celled; cells 1-ovuled. *Fruit* globose, 5-furrowed, umbilicate, 5-celled and seeded.

TIMBER. 987 **Structure of the Wood.**—Pinkish white, hard.

988 **A. Rohituka,** *W. & A.; Fl. Br. Ind., I., 559.*

Syn.—ANDERSONIA ROHITUKA, *Roxb.; Fl. Ind., Ed. C.B.C., 311.*
Vern.—*Harin hara, harin khana,* HIND.; *Tikta-raj, pitraj,* BENG.; *Sikru,* KOL.; *Sohága,* OUDH; *Bandriphal,* NEP.; *Tangarúk,* LEPCHA; *Lota amari, amora amari,* ASS.; *Okhioungsa, okhyang,* MAGH.; *Shem maram (the red-wood plant),* TAM.; *Chaw-a-manu, rohitakah,* TEL.; *Shem-maram,* MAL.; *Rohituka,* SANS.; *Hingal gass,* SINGH.; *Thitni, chayan-ka-you,* BURM.

Habitat.—An evergreen tree with large crown of branches, met with in Oudh, Assam, Sylhet and Cachar, Northern and Eastern Bengal, Western Ghâts, and Burma, the Andaman Islands, and Malacca.

Botanic Diagnosis.—*Leaves* 1-3 feet long, leaflets 9-15, in size 3 to 9 by 1½ to 4 inches; young parts tawny, closely pubescent, early glabrescent. *Flowers* white, bracteate, sub-sessile; male spikes panicled, female simple. *Calyx* 5-partite, petals 3. *Anthers* 6 *Ovary* 3-celled with 2 superposed ovules in each cell.

OIL. 989 **Oil.**—In Bengal an oil is expressed from the seeds. The natives, 'where the tree grows plentifully, extract this oil, which they use for various economic purposes. (*Roxburgh.*)

MEDICINE. 990 **Medicine.**—The bark is used as an astringent.

§ "The ripe seeds yield an oil which is burnt by the poorer classes

and is used as a stimulating liniment in rheumatism. The seeds are fried and bruised, then boiled with water, when the oil floats on the top. (*Surgeon D. Basu, Faridpur, Bengal.*)

Structure of the Wood.—Reddish, close and even-grained, hard. The concentric bands in this species are remarkable, since they are absent from the two other species. Average weight 40·5 lbs. per cubic foot. TIMBER. 991

The timber is of good quality, but is little used. In Chittagong canoes are sometimes made of it.

Amoora spectabilis, *Miq.; Fl. Br. Ind., I., 561.* 992

Vern.—*Amari,* Ass.

Habitat.—An evergreen tree, found in the eastern moist zones of Assam and Burma.

Botanic Diagnosis.—*Leaflets* 11-13, opposite or sub-opposite, oblong, acutely acuminate base obtuse, glabrescent, shining, glaucescent beneath, petiolate. *Male panicles* pedunculate, with alternate unequal branches. *Calyx* stellately puberulent, obtusely 3-lobed, short. *Petals* 3, imbricate, sub-stellate, velutinous along the back. *Staminal tube* urceolate, glabrous, shortly and obtusely 8-dentate. *Anthers* 8. *Fruit* obovoid-pyriform, 1¼ to 1¾ by 1 to 1¼ inch. Some doubt exists in botanical works regarding this species.

Structure of the Wood.—Red, hard, close-grained, durable, and takes a good polish. Weight 48 lbs. per cubic foot. TIMBER. 993

Used for boat-building and furniture in Assam.

AMORPHOPHALLUS, *Blume; Gen. Pl., III., 970; Monogr. Phanerog., DC., II., 308.* 994

A genus of tuberous-rooted herbs belonging to the Natural Order AROIDEÆ, Tribe PYTHNONIEÆ. There are in all some 25 species, inhabitants of tropical Asia and Africa, of which 7 are met with in India and Ceylon.

Leaves generally solitary, ascending from the flattened corm after the spathe has faded; *petiole* erect, variously spotted; blade large, primarily 3-sected and bulbiferous; segments pinnatifid or bipinnatifid or dichotomous, ultimate divisions oblong-acute. *Spathe* broad-ovate, base infundibuliform or campanulato-convolute, spreading above and exposing the spadix. *Spadix* erect, fleshy, as long as the spathe, appendix dilated fungus-like. *Male flowers* crowded, forming a fusiform section placed immediately above the *female* cylindrical section, *neuter* flowers none. *Perianth* none. *Female flowers,* ovary globose, 1-4 celled; *style* short or elongated; *stigma* entire, 2-4-lobed; *ovules* solitary in the cells, anatropous or half anatropous, decurved, funiculus short or sub-elongated, placenta basilar, micropyle inferior.

The word Amorphophallus is derived from ἄμορφος and φαλλός in allusion to the shapeless form of the plant, or rather to the barren appendix of the spadix, which is not only devoid of flowers, but assumes an irregularly crumpled form.

Amorphophallus bulbifer, *Blume;* AROIDEÆ. 995

Syn.—ARUM BULBIFERUM, *Roxb.; Fl. Ind., Ed. C.B.C., 310.*
Vern.—*Umla bela,* BENG.

Habitat.—A native of Bengal, plentiful in the neighbourhood of Calcutta, where it blossoms in May, the leaves appearing in the rainy season.

A. campanulatus, *Blume; Wight, Ic., t. 785.* 996

Syn.—ARUM CAMPANULATUM, *Roxb.*
Vern.—The tuber, *Zamin-kand,* PERS. and HIND.; *Ol,* BENG.; *Kanda, arsaghna,* SANS.; *Jangli-súran,* BOMB., CUTCH; *Súran,* MAR.; *Karu-*

naik-kishangu or *karuna-kalang, nalle-karuna-karang* (a variety), TAM.; *Kanda-godda, kanda, poti-kanda, durada-kanda-godda, manchik-anda* or *ghensi-kanda* (variety), TEL.; *Karuna-kishanna* or *karuna-karang,* MAL.; *Kandá,* DUK., HIND.; *Wa,* BURM.

It seems probable that one of the forms of this plant affords the *madan-mast* of Bombay druggists, described by **Dr. Dymock** (*Mat. Med., W. Ind., 664*) under the name of **Amorphophallus sylvaticus.** A note which **Dr. Dymock** has kindly supplied would seem to justify this inference, while, on the other hand, it is possible that the tubers of **Arum sylvaticum,** *Roxb.* (now known as **Synantherias silvatica,** *Schott.,*—see *Engler, Mono. Phaner. DC., 320*) affords the drug referred to by **Dr. Dymock,** the more so since that species is a native of Bombay. The name *madan-mast* appears, however, to be also given to **Amorphophallus campanulatus,** *Blume.,* "and in Madras to **Artabotrys odoratissima,** *R. Br.*" (*Moodeen Sheriff.*)

Habitat.—A native of India and Ceylon; cultivated throughout the peninsula, in rich moist soils.

MEDICINE. Corms. 997

Medicine.—The corm (or tuber) and the seeds are used as irritants and relieve the pain of rheumatic swellings when applied externally. It is considered a hot carminative in the form of a pickle.

Mr. Baden Powell says: "The roots contain a large quantity of farinaceous matter, mixed with acrid poisonous juice, which may be extracted by washing or heat. When fresh it acts as an acrid stimulant and expectorant, and is used in acute rheumatism." **U. C. Dutt** says: "The tubers contain an acrid juice, which should be got rid of by thorough boiling and washing, otherwise the vegetable is apt to cause troublesome irritation in the mouth and fauces. Medicinally *súrana* is considered serviceable in hœmorrhoids; in fact, one of its Sanskrit synonyms is *arsoghna,* or the curer of piles. It is administered in this disease in a variety of forms. The tuber is covered with a layer of earth and roasted in a fire; the roasted vegetable is given with the addition of oil and salt."

§ "The dried corm sliced is sold in Bombay, under the name of *madan-mast,* as a restorative, tonic, and carminative." (*Surgeon-Major W. Dymock, Bombay.*) "The tubers, first boiled with tamarind leaves and paddy husk, and then made into a curry with the usual condiments, is efficacious in bleeding piles. It produces intense itching of the tongue when tasted, and it is to remove this irritating quality that tamarind is largely used when cooking it." (*Honorary Surgeon P. Kinsley, Ganjam, Madras.*) "The cultivated or pinkish white variety is used as food. The tuber is cut into small pieces, boiled in water to get rid of the irritation, and then used as a '*bhurta,*' or in curry, or is fried with cocoanut pulp. Medicinally I have seen its benefit in bleeding piles. It should be used in the form of '*bhurta.*'" (*Surgeon-Major R. L. Dutt, M.D., Pubna, Bengal.*) "Recommended by native physicians in piles. I tried it in various forms without success." (*Assistant Surgeon Shib Chunder Bhuttacharji, Chanda, Central Provinces.*) "It is used externally in the form of poultice in the bites of insects, scorpions, &c. Internally in the form of a pickle, it is used as a laxative in hœmorrhoids." (*Brigade Surgeon J. H. Thornton, B.A., M.B., Monghyr.*) "Used as a stimulating poultice." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "Used in boils and ophthalmia." (*Surgeon H. W. Hill, Mánbhúm, Bengal.*)

Speaking of the *jangli súran,* **Dr. Dymock** says the tuber is peeled and cut into segments, and in that condition is sold in the Bombay native druggists' shops as *madan-mast.* "The segments are usually threaded upon a string, and are about as large as those of an orange, of a reddish-brown colour, shrunken and wrinkled, brittle and hard in dry weather; the surface is mammilated. When soaked in water they swell up and

become very soft and friable, developing a sickly smell." "*Madan-mast* has a mucilaginous taste, and is faintly bitter and acrid; it is supposed to have restorative powers, and is in much request." The above extract may probably be describing the properties of a plant quite distinct from **Amorphophallus campanulatus** (see remarks under vernacular names and also under **Synantherias silvatica**, *Schott.*).

Food.—The corms or solid bulbs are considered nutritious and wholesome when cooked, and are accordingly in common use as an article of food. They are boiled like potatoes and eaten with mustard; they are cooked in curries; they are cut into slices, boiled with tamarind leaves, and made into pickles; and they are also cooked in syrup and made into preserves. FOOD. Corms. 998

The larger corms have small lateral tuberosities; these are separated and form cuttings for propagation. They are planted immediately after the first rains (say May and June) in loose, rich soil, repeatedly ploughed. In twelve months they are fit to be taken up for use. If cultivated under favourable circumstances, each corm will weigh from 4 to 8 lbs., and they may be preserved for some time if kept dry. The average outturn is about 200 to 400 maunds per acre, and the price is about R2½ a maund.

§ "When cultivated the tuber becomes large and loses much of its irritant properties, and when boiled or otherwise cooked makes a substantial starchy vegetable. It is sold largely in the Calcutta bazars." (*Surgeon K. D. Ghose, Khulna.*) "Used as food, possessing most of the properties of **Alocasia indica.** If not properly cultivated in loose soil it becomes irritant in its action." (*Surgeon D. Basu, Faridpur, Bengal.*) "When cooked the tubers are wholesome and nutritious." (*Deputy Surgeon-General G. Bidie, Madras.*)

Amorphophallus dubuis, *Blume.* 999

A native of Ceylon and the Malabar Coast of India.

A. giganteus, *Blume.* 1000

Syn. for **Conophallus giganteus,** *Schott.*
A native of Malabar, Ceylon, Java, &c.

A. lyratus (Arum lyratum, *Roxb.***)** 1001

Imperfectly known; said to be a native of the Circars, Madras.

A. margaritifer, *Kunth,* and **Arum margaritiferum,** *Roxb.* (*Dymock, Mat. Med., Western India, 664*); Syn. for **Plesmonium margariti ferum,** *Schott.,* which see.

A. tuberculiger, *Schot.* 1002

A native of the Khásia Hills and of Sikkim.

A. zeylanicus, *Blume.* 1003

A native of Ceylon and Java.

AMPELIDEÆ. 1004

"Small trees or shrubs, usually climbing by means of tendrils, more rarely radicant (sometimes herbaceous in *Leea*); juice copious, watery. *Stems* angled, compressed or cylindric, with numerous very large proper vessels. *Leaves* alternate, usually petioled, simple or digitately or pedately 3-9 foliolate, rarely pinnate or decompound. *Flowers* umbellately-paniculately- or spicately-cymose. *Peduncles* often transformed into simple or compound tendrils or adhering to rocks or trees by viscid pads

terminating the ultimate segments, or expanded into a broad floriferous membrane (**Pterisanthes**). *Flowers* regular, hermaphrodite, rarely unisexual. *Calyx* small, entire or 4-5-toothed or -lobed. *Petals* 4-5, distinct, or cohering, valvate, caducous. *Stamens* 4-5, opposite the petals, inserted at the base of the disk or between its lobes, filaments short-subulate; anthers free or connate, 2-celled, introrse. *Disk* free or connate with the petals, stamens or ovary, annular or variously expanded. *Ovary* 2-6-celled; *style* short, slender, conical or 0; *stigma minute or large and flat*, sublobed; ovules 1-2 in each cell, ascending, anatropal, raphe ventral. *Berry* 1-6-celled; cells 1-2-seeded. *Seed* erect, often rugulose, albumen cartilaginous; *embryo* short basal, *cotyledons* ovate. *Distrib.*—Species about 250, inhabiting the tropical and temperate regions of the whole world.

Scandent shrubs, usually bearing tendrils. Flowers racemose or cymose. Ovary 2-celled, cells 2-ovuled . . . . 1. **Vitis.**
Flowers sessile on the dilated membranous peduncle . 2. **Pterisanthes.**
Erect shrubs destitute of tendrils, petals and stamens connate with the dsk. Ovary 3-6-celled, cells 1-ovuled . . . . . . 3. **Leea.**"

(*Flora of British India, I., 645.*)

The above extract has been published here with the object of suggesting the names of the genera of this family; the economic information will be found under these in their respective alphabetical positions.

Distribution of the Ampelideæ.—There are in all some 250 species belonging to this order, chiefly met with in the tropics, extending to the temperate regions. They are rare in America, and exceedingly rare in the Pacific Islands; none are indigenous to Europe. The vine-grape appears to have been originally a native of Georgia and Mingrelia, but it is now cultivated in all countries with a mean summer temperature not below 66° Fh. Where the temperature falls below 66° Fh. the grapes never become sweet; where it is much above that temperature they do not mature, although the plant may flourish, as in Indian gardens.

In India there are in all 94 species, grouped in three genera. Of these 52 or 55·3 per cent. are confined to the plains, 34 or 35·1 per cent. are found up to an altitude of 5,000 feet, and 8 or 8·5 per cent. up to an altitude of 10,000 feet. Geographically, 50 or 53·1 per cent. are confined to East India, 10 or 10·6 per cent. to West India, 8 or 8·5 per cent. to South India, and 3 or 3·2 per cent. to North India, all three being in the Upper Gangetic Sub-Division. Of the remaining 23 species, 8 or 8·5 per cent. are found in two or more regions not including North India, and 15 or 15·9 are found in North India as well as in one or more of the other divisions. All these 15 species are found in the Upper Gangetic Sub-Division; 5 of them are also found in the West Panjáb, and 2 in the dry tracts of the Panjáb and Sind Sub-Division of North India.

1005 **Amygdalus communis,** *Linn.*, see **Prunus Amygdalus,** *Baill.*, ROSACEÆ.

Amyris commiphora, *Roxb.*, see **Balsamodendron Roxburghii,** *Arn.*, BURSERACEÆ.

ANABASIS, *Linn.; Gen. Pl., III., 72.*

Anabasis multiflora, *Moq.;* CHENOPODIACEÆ; *DC. Prod., XIII., 2, 212.*

Vern.—*Ghalme, lána, metra láne, gora lane, dána, shor lana, búi, choti,* PB.

Habitat.—Met with in the Panjáb, a short distance east of the Sutlej.

Medicine.—Mr. Baden Powell mentions this plant amongst his drugs, but says nothing of its medicinal property. MEDICINE. 1006

Fodder.—*Camels are fond of the plant.* FODDER. 1007

ANACARDIACEÆ.

1008

"Trees or shrubs; juice often milky and acrid. *Leaves* alternate, opposite in **Bouea**, exstipulate, simple or compound. *Inflorescence* various; flowers small, regular, unisexual, polygamous, or bisexual. *Calyx* 3-5-partite, sometimes accrescent, spathaceous in **Gluta**. *Petals* 3-5, alternate with the sepals, free, rarely O, imbricate or valvate in bud, sometimes accrescent. *Disk* flat, cup-shaped or annular, entire or lobed, rarely obsolete. *Stamens* as many as the petals, rarely more, inserted under, rarely on, the disk; filaments usually subulate; anthers 2-celled, basi-or dorsi-fixed. *Ovary* superior, half inferior in **Holigarna**, 1- or 2-6-celled, rudimentary or 2-3-fid in the ♂; of 5-6 free carpels in **Buchanania**; styles 1-4 or stigma sub-sessile; ovules solitary in the cells, pendulous from the top or wall or from an ascending basal funicle. *Fruit* usually a 1-5-celled 1-5-seeded drupe; stone sometimes dehiscent. *Seed* exalbuminous; embryo straight or curved, cotyledons plano-convex, radicle short. *Distrib.*—Chiefly tropical; genera about 45; speciesabout 450.

"**Sorindeia madagascariensis**, *DC.* (*Wall. Cat.*, *8491*), is cultivated in gardens in India.

"**Tribe I. Anacardieæ.** *Ovary* 1-celled, or if 2-celled, with one cell early suppressed.

(A.) Ovules pendulous from a basal fanicle.

* *Sepals and petals not accrescent.*

Calyx 4-5-partite. Petals 4-6. Stamens 4-10. Leaves alternate, usually compound . .	1.	**Rhus.**
Calyx 5-partite. Petals O. Stamens 3-4. Leaves alternate, compound . . .	2.	**Pistacia.**
Calyx 4-5 partite. Petals 4-5. Stamens 1-5. Style filiform. Leaves alternate, simple .	3.	**Mangifera.**
Calyx 5-partite. Petals 5. Stamens 8-10, all or a few only perfect. Torus stipulate. Style filiform. Leaves alternate, simple . .	*3.	**Anacardium.**
Calyx 3-5 partite, valvate. Petals 3-5. Stamens 3-5, all perfect. Style short. Leaves opposite, simple	4.	**Bouea.**
Calyx spathaceous. Petals 4-6. Stamens 4-6. Torus stipulate. Style filiform. Leaves alternate, simple	5.	**Gluta.**
Calyx 3-5 lobed. Petals 3-5. Stamens 10. Carpels 5-6, one only perfect. Styles short. Leaves alternate, simple	6.	**Buchanania.**

** *Sepals or petals accrescent. Leaves simple.*

Calyx spathaceous. Stamens 5 or numerous .	7.	**Melanorrhœa.**
Calyx 5-partite. Stamens 5	8.	**Swintonia.**

(B.) Ovules pendulous from the top of the cell or from the walls of the ovary above the middle.

* *Leaves 3-foliolate or pinnate.*

Calyx not accrescent. Petals valvate. Stamens 10. Style 1	9.	**Solenocarpus.**

Calyx not accrescent. Petals imbricate. Stamens 10. Style 1 . . . . . . 10. **Tapiria.**
Calyx not accrescent. Petals imbricate. Stamens 5, with 5 staminodes. Style very short 11. **Pentaspadon.**
Calyx not accrescent. Petals imbricate. Stamens 8-10. Styles 3-4 . . . . . 12. **Odina.**
Calyx accrescent. Petals 4. Stamens 4. Style 3-fid . . . . 13. **Parishia.**

** *Leaves simple.*

Petals imbricate. Stamens 5. Styles 3. Drupe on a much-enlarged peduncle . . . . 14. **Semecarpus.**
Petals imbricate. Stamens 5. Style 1. Drupe superior . . . . 15. **Drimycarpus.**
Petals valvate. Stamens 5. Styles 3. Drupe inferior . . . . 16. **Holigarna.**
Petals valvate. Stamens 5. Style 1. Drupe superior . . . . 17. **Melanochyla.**
Petals imbricate. Stamens 4. Style 1, short. Drupe superior . . . . 18. **Nothopegia.**
Petals imbricate. Stamens 6-10. Style 1. Drupe superior . . . . 19. **Campnosperma.**

Tribe II. Spondieæ. *Ovary* 2-5-celled; ovules pendulous. Leaves pinnate.

Flowers polygamous. Stamens 8-10. Styles 4-5, free above . . . . 20. **Spondias.**
Flowers bisexual. Stamens 10. Style 5, thick, connate at the lips . . . . . . 21. **Dracontomelum.**

Doubtful genus.

Calyx 3-fid. Stamens 3. Ovary 3-celled. Leaves entire . . . . 22. **? Rumphia.**"

(*Fl. Br. Ind., Vol. II., pp. 7-8.*)

The above analysis of the genera of Anacardiaceæ will be found useful, in enabling the reader to recognise the plants of economic interest which belong to this family; for fuller details consult their respective alphabetical positions in this work.

1009 **Distribution of the Anacardiaceæ.**—There are in all some 450 species belonging to the Anacardiaceæ as defined by the *Genera Plantarum.* They are chiefly inhabitants of the tropical regions of the Old World, but are fairly represented in tropical America, and less frequent in Australia. Only a few species (but these abundant in individuals) reach South Europe, South Africa, or North America. There are in India 116 species, referred to 23 genera. Of these 83 or 71·5 per cent. are peculiar to the plains, 28 or 24·8 per cent. ascend to 5,000 feet in altitude, and 5 or 4·3 per cent. reach higher altitudes. In their distribution over the peninsula of India they show a corresponding preference for the moist and extra-tropical regions. Sixty-eight species or 58·6 per cent. are peculiar to the eastern division of India, 17 or 14·6 per cent. to South India and Ceylon; 7 are peculiar to North India (3 of these in the Upper Gangetic basin, 1 in the South-Eastern Panjáb and 3 diffused over both these sub-divisions of North India, but none of the endemic North Indian species seem to pass into the drier and desert tracts of the Eastern Panjáb and Sind). The remaining 12 Indian species are less local, being diffused through at least two or more of the divisions of India, 11 of them

passing to Upper India, of which 3 occur in the East Panjáb and Sind, and one species follows the coast of India, appearing to require the sea atmosphere.

1010 **Affinities of the Anacardiaceæ.**—They are placed in most works on systematic botany before the Leguminosæ and after Rutaceæ, Zygophylleæ, Simarubeæ, Burseraceæ, Rhamneæ and Sapindaceæ, to which they bear their closest relations. Through Leguminosæ they have many features of resemblance to the Amygdaleæ in Rosaceæ, especially in habit, woody stems, alternate leaves, perigynous stamens, and polypetalous corolla, the solitary carpel, drupaceous fruit and exalbuminous seed. They have a strong affinity to the Juglandeæ; indeed, certain authors (**Kunth, Endlicher,** &c.) have combined the latter with the Anacardiaceæ (or Terebinthaceæ). **De Candolle,** while retaining Burseraceæ, excludes Juglandeæ from them. They are also closely related to Connaraceæ and Burseraceæ, the latter, by **Baillon** and other authors, being viewed as a tribe; they differ chiefly in the two-ovuled condition of Burseraceæ, the ovule having also a superior micropyle. **Baillon,** in addition to the above tribes, places the Mappieæ and Phytocreneæ as tribes under this family. Most modern authors, including **Sir J. D. Hooker,** exclude Burseraceæ, Sabiaceæ, and Juglandeæ, these forming respectively independent natural orders, while Anacardiaceæ has been restricted to the tribes Anacardieæ and Spondieæ.

1011 **Properties and Uses of the Anacardiaceæ.**—They yield food, medicine, oil, gum, and resin, *turpentine, varnish, dye, tan,* and *useful woods.* The Pistachio nut, the Mango, the Cashew-nut, the Spanish Plum (Spondias), and the nut of **Semecarpus Anacardium** are regularly eaten and prized as amongst the best of Indian fruits. The barks, leaves, young fruits, seeds, and oils obtained from these plants, as also many others, are regarded as possessing remedial properties. The resin is often very valuable. **Pistacia Lentiscus** yields the resin *mastic,* much used in the East to perfume the breath, strengthen the gums, as also to flavour wines and confectionery. In England it is used for varnishing pictures and in dentistry. **P. Terebinthus,** a Mediterranean tree, yields Cyprus turpentine. **Melanorrhœa usitatissima** yields the celebrated black varnish of Burma. **Rhus succedanea,** Japanese vegetable wax; **R. Vernix,** Japanese varnish; the Indian **Holigarna longifolia** also yields a good varnish. A large number of Indian species yield gum at certain seasons of the year: **Odina Wodier** is simply covered with its brown gum streaking down the stem and ultimately becoming black.

1012 **Rhus coriaria** and **R. cotinus,** the Sumach, are much-prized tans, the wood of the last species yielding a good orange dye. In Europe a tincture is chiefly used for this purpose; with Cochineal or Prussian blue it gives chamois or green tones. The juice of the pericarp of **Semecarpus** gives an indelible black ink, used for marking linen.

ANACARDIUM, *Rottb.; Gen. Pl., III., 420.* 1013

A genus of shrubs or trees belonging to the Natural Order ANACARDIACEÆ, comprising 6 species, natives of America, one of which has been naturalised in India.

Leaves alternate, simple, quite entire. *Panicles* terminal, bracteate. *Flowers* small, polygamous; *sepals* and *petals* not accrescent. *Calyx* 5-partite; *sepals* erect, deciduous; *disk* erect, filling the base of the calyx. *Petals* 5-linear-lanceolate recurved imbricate. *Stamens* 8-10, all or only a few fertile; *filaments* connate and adnate to the disk. *Ovary* obovoid or obcordate; *style* filiform, excentric *stigma* minute; ovule 1, ascending from a lateral funicle. *Nut* kidney-shaped, seated on a large pyriform fleshy body formed of the enlarged disk and top of peduncle; pericarp cellular and full of oil. *Seed*

kidney-shaped, ascending; *testa* membranous, adherent; *cotyledons* semi-lunar; *radicle* short-hooked.

The generic name is derived from ἀνά, resemblance, and καρδία, heart, in allusion to the form of the nut.

1014 **Anacardium occidentale,** *Linn.; Fl. Br. Ind., II., 20.*

THE CASHEW-NUT.

Vern.—*Kájú,* HIND., GUJ., DEC.; *Hijli-bádám, káju,* BENG.; *Kájú, káju-kaliyá,* BOMB.; *Kájúcha-bi, kájú,* MAR.; *Mundiri, kottai, kottai-mundiri,* TAM.; *Jidi-mámidi vittu, muntamámidi-vittu, jidi-ánti, jiedi pundú* (fruit), TEL.; *Jidi váte, kempu géru bija, gera-poppu geru váte, gerabija,* KAN.; *Paranki-máva kuru, kappal-chérun-kuru, kappa-mávakuru,* MALA.; *Káju* or *kaju-atta,* SINGH.; *Thee-noh, thayet, thee-hot, sihosayesi* or *tihotiya-si,* BURM.

Habitat.—A tree, 30 to 40 feet; originally introduced from South America, now established in the coast forests of India, Chittagong, Tenasserim, and the Andaman Islands, and over South India.

"The local name *káju* appears to be restricted to the Konkan. The tree is indigenous to the West Indies. It is probable that the Portuguese on its introduction to the west coast of India called it *káju* as a rendering of the Brazilian name *acajau.* The French, by a similar transliteration, called it *Cashew.*" (*Bomb. Gaz., X., 38.*)

Properties and Uses—

GUM. 1015 **Gum.**—**Rai Kanai Lal De, Bahadur,** in his *Indigenous Drugs of India,* mentions that the bark of this plant yields a gum.

§ "This gum occurs in large stalactitic pieces; it is yellow or reddish, and only slightly soluble in water. It is obnoxious to insects." (*Surgeon-Major Dymock, Bombay.*)

Sap. 1016 **The sap.**—The juice issuing from incisions in the bark is in demand as an indelible marking ink. (*Br. Burm. Gaz., I., 136.*) The astringent juice is used by native workmen as a flux for soldering metals. (*Bomb. Gaz., X., p. 38.*)

DYE. 1017 **Dye.**—The bark may be used for tanning. The pericarp gives an oil, called *Cardol,* which is very astringent, and is used by the Andamanese to tan or colour fishing-nets, so as to preserve them. **Dr. Dymock** informs me that this oil is called *Dík* in Goa, where it is much used as a tar for boats and nets.

OIL from the nut. 1018 **Oil.**—From this plant two distinct oils are obtained:—

1st.—The kernels, when pressed, yield a light-yellow bland oil, very nutritious; the finest quality in every respect equal to almond oil, and considered superior to olive oil. The yield is about 40 per cent. The kernels are so extensively eaten in India, however, that it is almost impossible that a trade could at present be done in this oil. Samples of this fixed oil, and information as to methods of preparation and extent of trade, are much required. The kernels have been once or twice exported to Europe under the name of "Cassia Nuts."

Cardole or oil from the shell. 1019 *2nd.*—*Cardole* or *Cashew-apple-oil.*—This is prepared from the pericarp or shell of the nut. It is black, acrid, and powerfully vesicating. In the Andamans, it is used to colour and preserve fishing lines. It is an effective preventive against white-ants in carved wood-work, books, &c. The yield is 29½ per cent. (The *British Burma Gazetteer, I., 131,* says: "The pericarp of the nuts produces a black acrid oil, *Cardole.*")

MEDICINE Acrid oil. 1020 **Medicine.**—The medicinal uses of this plant are many. The acrid oil is used as an anæsthetic in leprosy, and as a blister in warts, corns, and ulcers. Between the laminæ of the shell of the kernel there is a black caustic fluid, which contains an acrid, oily principle, *Cardol,* and a

peculiar acid, *Anacardic Acid.* It possesses powerful rubefacient and vesicant properties. The spirit distilled from the expressed juice of the fruit may be used as a stimulant. Spirit. 1021

§ "Fruit eaten as a remedy for scurvy. The juice of the nut is used as a substitute for iodine, locally." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "The oil I have used with benefit in the anæsthetic variety of leprosy." (*Assistant Surgeon Bolly Chand Sen, Calcutta.*) "The oil obtained from the shell by maceration in spirit is the very best application for cracks of the feet, so common with natives." (*Brigade Surgeon C. Joynt, M.D., Poona.*) "It is locally applied to the sole of the foot as a remedy for cracking of the cuticle." (*Surgeon-Major Henry David Cook, Calicut, Malabar.*) "The oil is efficacious when faintly brushed as a local stimulant in psoriasis." (*Assistant Surgeon Devendro Nath Roy, Calcutta.*)

Food.—Produces a small fruit, within which is the nut known as the Cashew nut, commonly eaten roasted,—a process which improves the flavour. § "The ripe fleshy stalk or torus of this plant is eaten as a fruit. In Purí they used to call it *lanká ám.* The kernels are fried and eaten; they are also made into confectionery with sugar. They are sold in the markets in Purí under the name of *Hidjlí badam.*" (*U. C. Dutt, Serampore.*) "The seeds deprived of their shell are eaten." (*Deputy Surgeon-General G. Bidie, Madras.*) FOOD. Nuts. 1022 Receplace. 1023

Structure of the Wood.—Red, moderately hard, close-grained. Weight 38 lbs. per cubic foot. TIMBER. 1024

Used in Burma for packing-cases, for boat-building, and charcoal.

ANACHARIS, *L. C. Rich.; Gen. Pl., III., 450.* 1025

Anacharis or American duckweed. A delicate, much-branched, aquatic plant, belonging to the Natural Order HYDROCHARIDEÆ. By the *Genera Plantarum* this genus has been reduced to **Elodea**, *Mich.*

This curious plant made its appearance simultaneously in various parts of Great Britain, about 30 years ago, and its spread from lake to lake has attracted much attention. How it was introduced is unknown, and it is equally difficult to know how it is propagated with such rapidity; for the plant is diœcious, and only female flowers have been discovered in Great Britain; it cannot therefore produce fertile seeds. The date of its introduction into India seems equally difficult to determine; but at the present moment most of the tanks and lakes of the plains have become almost impossible of navigation from the immense masses of this plant which choke up every piece of water under 8 to 10 feet in depth. It affords rare feeding-ground for aquatic birds, both from the tender leaves, which are greedily eaten, and from the multitude of insects and snails which live amongst the portions of the plant which reach above the surface of the water. I have failed to discover any vernacular name for it, other than the generic appellation to all aquatic weeds. It is sometimes used along with **Vallisneria** in the native process of refining sugar.

ANACYCLUS, *Linn.; Gen. Pl., II., 419.* 1026

Anacyclus Pyrethrum, *DC.;* COMPOSITÆ; *DC. Prod., VI., 15.*

THE PELLITORY OF SPAIN.

Vern.—*Akarkará,* HIND., BENG., BOMB.; *Akkalkará, akkirakáram,* TAM. and TEL.; *Akkalkádhá,* MAR.; *Akkala-karé,* KAN.; *Akorkaro,* GUJ.; *Agal-gárá,* DUK.; *Akki-karuká, akkilá-káram,* MUL.; *Aáqarqarhá* or *áquarqarhá, aúdul-qarhá, údal-qarha,* ARAB.; *Akara karava, akaráka-rabha,* SANS.

Habitat.—Indigenous to North Africa, whence it has been introduced into South Europe. "The root is collected chiefly in Algeria and is exported from Oran, and to a smaller extent from Algiers." A large amount is also shipped from Tunis to Leghorn and Egypt. (*Dymock.*)

MEDICINE. Root. 1027 **Medicine.**—THE ROOT of this plant has stimulant properties, and when locally applied, acts as an irritant and rubefacient. It is also used as a sialagogue. In India it is often given to parrots, with the idea of helping to make them talk. It is imported into India, chiefly from Algeria. Ainslie (*Mat. Ind., I., 300*) gives a long account of this medicine. He informs
Infusion. 1028 us that vegetarians prescribe an infusion of it, in conjunction with the lesser galangal and ginger, as a cordial and stimulant in lethargic cases, in palsy, and in certain stages of typhus fever, and that they also order it to be chewed as a masticatory for toothache. It certainly possesses powerful stimulant properties, but is scarcely ever employed in Europe as an internal remedy; though it has been found useful as a sialagogue, and as such, Dr. Thomson says, has been given with success in some kinds of headache, apoplexy, chronic ophthalmia, and rheumatic affections of the face.

Special Opinions.—§ "The root is used by natives as a nervine tonic in cases of facial palsy, paralysis, hemiplegia, epilepsy, and cholera. It is also employed in rheumatism, sciatica, and dropsy. As a sialagogue it is used to allay toothache. Aphrodisiac, emmenagogue, and diuretic properties have also been assigned to it. Its local application to the forehead is said
Gargle. 1029 to remove headache. A gargle is reputed to be very efficacious in affections of the teeth, throat, and tonsils. In a drachm-and-a-half doses it is said to act as a purgative. Dissolved in olive oil and rubbed over the skin, it is reported to produce profuse perspiration, and thus to cut short an attack of fever. As an expectorant it has been employed with benefit in cases of chronic bronchitis." (*Assistant Surgeon Gholam Nabi.*) "It is used in toothache, in which it sometimes gives instantaneous relief." (*Surgeon J. C. Penny, M.D., Amritsar.*) "It is expec-
Decoction. 1030 torant." (*Surgeon-Major J. T. Fitzpatrick, M.D., Coimbatore.*) "Decoction used in bronchitis as an expectorant." (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*) "Decoction of it is used by native practitioners as a gargle in sore-throat." (*Brigade Surgeon S. M. Shircore, Moorshedabad.*) "Is a powerful sialagogue, and I have seen it give relief in rheumatic pains in the face." (*Surgeon-Major John North, Bangalore.*) "Frequently given to infants in the Deccan and the Konkan from the idea of its assisting to make them talk. As a stimulant the dose is one to five grains." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "Is used by the
Powder. 1031 natives of India as an aphrodisiac. Applied in the form of a powder to a carious tooth, it is said to remove toothache; useful in flatulent dyspepsia as a carminative." (*Assistant Surgeon Jaswant Rai, Mooltan.*)

1032 ANADENDRON, *Schott.; Gen. Pl., III., 991.*

Anadendron, sp.; AROIDEÆ.

Vern.—*Yolba*, AND.

FIBRE. 1033 **Fibre.**—In the Andaman Islands, bow-strings are made from the fibre of the bark of this plant, to which, to increase strength, a coating of black bee's-wax (*Tobul-pid*) is frequently applied. Netted reticules are also prepared from this fibre, which are used by women for carrying small objects. (*Mr. Mann's Andaman and Nicobar Islands Catalogue, Calcutta Exhibition.*)

ANAGALLIS, *Linn.; Gen. Pl., II., 637.* 1034

A genus of slender herbs belonging to the Natural Order PRIMULACEÆ, comprising some 12 species, inhabitants of the north temperate zones, 1 occurring on the temperate Himálaya.

The generic name is derived from ἀνά, again, and ἀγάλλω, to make glorious, or to cause mirth, from its fabled virtue to remove sadness. This name was most probably suggested from the beauty of the flowers, or from the fact that as the sun rises and sets, so the sparkling Anagallis opens and closes, hence the popular name Poorman's weather-glass.

Anagallis arvensis, *Linn., var.* **cœrulea**; *Fl. Br. Ind., III., 506.* 1035

Vern.—*Jonkhmári, jainghani,* N.-W. P.

Habitat.—Found on the mountains of Bengal and of the North-West India, and the Himálaya generally, from Nepal westward, ascending to 8,000 feet; common in the neighbourhood of Simla, on rubbish-heaps and walls around fields; Central India, the Nilgiri Hills, and Ceylon (perhaps introduced).

Medicine.—Used to intoxicate fish and to expel leeches from the nostrils. (For this purpose the juice of the various species of **Begonia** would also seem admirably suited,—see **Leech.**) It is used in cerebral affections, leprosy, hydrophobia, dropsy, epilepsy, and mania. Formerly it was used in Europe in epilepsy, mania, hysteria, delirium, enlargement of the liver, spleen, dropsy, emaciation, stone, the plague, bites of serpents and mad animals, and in numerous other diseases. MEDICINE. The Plant. 1036

Said to be poisonous to dogs, producing inflammation of the stomach. (*Baden Powell, Panjáb Products, I., 368.*)

ANAMIRTA, *Colebr.; Gen. Pl., I., 35.* 1037

A climbing shrub (belonging to the Natural Order MENISPERMACEÆ), a native of Eastern Bengal, the Khásia hills, and Assam; and from the Konkan to Orissa and Ceylon.

Flowers panicled. *Sepals* 6, with 2 adpressed bracts. *Petals* O. *Male flowers:* anthers sessile, many, arranged upon a vertical column, 2-celled, bursting transversely. *Female flowers:* staminodes 9, clavate, 1-seriate. *Ovaries* 3 on a short gynophore; *stigma* subcapitate reflexed. *Drupes* on a 3-fid gynophore obliquely ovoid, dorsally gibbous; *style* scar sub-basal; *endocarp* woody. *Seed* globose, embracing the sub-globose, hollow, intruded endocarp; *albumen* dense, composed of horny granules; *embryo* curved; *cotyledons* narrow-oblong, thin-spreading.

Anamirta Cocculus, *W. & A.; Fl. Br. Ind., I., 98.* 1038

COCCULUS INDICUS of Pharmacy.

Vern.—*Kákmári, kákmári-ké-binj,* HIND., DUK.; *Kákamári,* SANS., BENG.; *Káka-phala, vátoli, kákphal,* BOMB.; *Kakkáy-kolli-virai* or *kákà-koli-viari,* TAM.; *Káki-champa, kaká-mári, vittu,* TEL.; *Kákamári-bija,* KAN.; *Karanta-kattin-káya, polluk-kaya,* MALA.; *Tittaval,* SINGH.; *Tuba bidji,* MALAY.

Habitat.—A climbing shrub of South and East India, Burma, and Oudh forests.

Oil.—The fruit contains a large quantity of fixed oil. The fat expressed from the seeds, which amounts to about half their weight, is used in India for industrial purposes. OIL. 1039 Fat from Seeds. 1040

Medicine.—The bitter berries of this plant are used in India to poison fish and crows. In medical practice they are never administered internally, but are sometimes used in the form of an ointment. This ointment is employed as an insecticide, to destroy pediculi, &c., and in some obstinate forms of chronic skin diseases. (*Bentley & Trimen.*) MEDICINE. Berries. 1041 Ointment. 1042

ANANAS sativa.

The Pine Apple.

The Surgeon-General of Madras proposed to exclude this drug from the new edition of the *Pharmacopœia of India*. (*Home Department Official Correspondence.*)

Dr. **Dymock** (*Mat. Med., W. India, 20*) says: "This plant, which is a large climbing shrub with rough bark, abounds on the western coast of India. Its properties have been known to the Hindús from an early date, and the fruit appears to have been long in use as a remedy in certain skin affections, possibly of parasitic origin. The Arabs were probably also acquainted with it, but there is no satisfactory evidence upon this point to be gathered from their writers upon materia medica."

§ "The berries of **Anamirta cocculus** are an active poison in large doses, but not in small ones. I have taken the drug myself up to five grains, three times a day, without any effect, good or bad. The cheapest and most convenient way of using it externally is in the form of oily solution,
Oily solution. 1043 with cocoanut oil, in the proportion of one drachm of the former to one ounce of the latter." (*Honorary Surgeon Moodeen Sheriff, Khan Bahadur, Madras.*)

Chemical Properties.—§"The poisonous properties of the seeds are due to Picrotoxin $C_{12}H_{14}O_5$. The neutral principle readily crystallises, and has an intensely bitter taste; in consequence of this fact, **Cocculus Indicus** has been employed as a substitute for hops in the manufacture of beer. In addition to Picrotoxin two other crystalline principles have been described as existing in the berries, *Menispermine* and *Paramenispermine*." (*Surgeon C. J. H. Warden, Calcutta.*)

1044

ANANAS, *Adans.; Gen. Pl., III., 662.*

A genus of almost stemless plants, with a rosette of lanceolate leaves, belonging to the Natural Order BROMELIACEÆ, and comprising some 5 or 6 species, inhabitants of tropical America.

Inflorescence densely crowded and spirally arranged into a strobiliform head. *Bracts* and *ovary* with the receptacle, developing into a succulent compound fruit. *Sepals* and *petals* distinct on the apex of each ovary.

The generic name is supposed to be a Latinised form of the Guiana or South American name *Nanas*.

1045 **Ananas sativa,** *Linn.*

THE PINE APPLE.

Vern.—*Anánas, anannas,* HIND.; *Anánash* (vulgarly *anáras*), BENG.; *Anánas,* GUJ., MAR.; *Anáshap-pasham,* TAM.; *Anása-pandu,* TEL.; *Anánasu-hannu,* KAN.; *Annanas, kaita-chakka,* MALA.; *Aainunnás,* ARAB. and PERS.; *Annási,* SINGH.; *Nanna-ti,* BURM.

Habitat.—This and all the other members of the same order now met with in India have been introduced from America. From the vernacular names of this species, one would suppose it had reached India through Persia.

History.—A perennial universally cultivated in all tropical and sub-tropical countries. The pine apple was unknown to Europe, Africa, and Asia, prior to the discovery of the Western Continent. It is apparently a native of Brazil, and it was first made known to Europe by **Goncatlo Hernandez** in 1513; it was introduced by the Portuguese into Bengal in 1594. "Its introduction is expressly mentioned by Indian authors such as **Abul Fuzl** in the *Ayeen Akbari*, and again by the author of *Dhara Shekoih* (*Royle*). The rapidity with which it spread through Europe, Asia, and Africa is unparalleled in the history of any other fruit. It seems to have met with universal acceptance; hence, apparently, the purity with which its American name *Anasi* or *Nanas* has passed through

so many languages. The Asiatic recipient of a living plant seems to have carried off, and adopted as his own, the name by which so valuable a treasure was made known to him. The first pine apples which appear to have reached England were those presented to Cromwell. The next notice is of the "Queen pine" presented to Charles II., on the 19th July 1688, having been sent from Barbados, and the first pine apple grown in England seems to have been reared from the rejected crowns of these. It was first systematically cultivated in Europe by M. Le Cour, a Dutch merchant near Leyden. It was first fruited in England in the year 1712; since then its cultivation may be said to have become universal all over Southern Europe. The largest pine apple on record was reared in England, and it weighed over 14 lbs.

Properties and Uses—

Fibre.—The leaves, which require to be steeped in water for 18 days, yield a beautiful fibre, which, but for the difficulty of extraction, would be largely used. This fibre is in request in India for threading necklaces, as it does not rot, and is very strong. Both the wild and cultivated pine apple yield fibres which, when spun, surpass in strength, fineness, and lustre those obtained from flax. It can be employed as a substitute for silk, and as a material for mixing with wool or cotton. For sewing-thread, twist, trimmings, laces, curtains, and the like, its particular qualities render it specially applicable. (*Chambers' Journal.*) In 1839, **Miss Davey**, in answer to an advertisement published by the Agri.-Horticultural Society of India, submitted some thread made from pine apple leaves, of which she remarked that it was equal to the finest flax thread manufactured in Europe, and considered it comparable to the best cambric thread. This lady, with some difficulty, owing to the conservative objections of the Dacca weavers, whom she tried to induce to make some cloth from this fibre, manufactured handkerchiefs, cuffs, and some cloth which are alluded to in the Proceedings of the Society as "elegant specimens." Some thread was sent home, but the English spinners seem to have been as prejudiced against this fibre as the Dacca weavers were.

FIBRE. 1046

Thread. 1047

Silk substitute. 1048

In the Agri.-Horticultural Society's Journal for 1853, some trials of various fibres made by Harton & Co., Calcutta, are published: a $\frac{8}{4}$-inch in circumference rope made of pine apple fibre easily bore a weight of 42 cwt., and broke only with a weight of 57 cwt. (*Tropical Agriculturist, III., 522.*) In *Royle's Fibrous Plants of India* will be found some interesting information regarding the pine apple, of which the following may be given as an abstract of the more important facts. It has become quite naturalised in some parts of this country. It flourishes in Assam and is very abundant on the Khásia hills. **Captain Turner** found it plentiful at the foot of the Himálaya. According to **Dr. Helfer**, the pine apple is so abundant in Tenasserim as to be sold in Amherst Town, in June and July, at the rate of one rupee for a boat-load. The natives know it only by the American name, which they transform into *Nana thi* or *Nanna* fruit. The pine apple of the Phillipine Islands is much valued for its fine hair-like fibres, of which the famous pine apple cloth is manufactured. **M. Perottet** considers this to be a distinct species and has named it **Bromelia Pigna.** **Mr. Bennett** visited a plantation near Singapore made by a Chinaman, who prepared the fibre for export to China, where it is used "in the manufacture of linens." The leaves, in the green state, were laid upon a board and the epidermis removed with a knife. The fibres were then easily detached by the hand on being raised with a broad knife. The separation of the pine apple fibre is practised in many parts of the East Indies. The natives of Burma, however, do not seem to have been acquainted with the *Ananas* fibre, although the plant is very abundant there. From some experiments

Pine Apple Cloth. 1049

ANANAS sativa.

The Pine Apple.

which were made by **Dr. Royle**, it appears that a certain quantity of the fibre prepared at Madras bore 260 lbs., and a similar quantity prepared in Singapore bore 350 lbs., while New Zealand flax bore only 260 lbs. **Mr. Zincke** took out a patent for the manufacture of thread from this fibre. Bleaching destroys the adhesion between the bundles of fibres, and renders it fit to be spun in the same way as flax. Twine, cord, and fishing-lines are also sometimes made of it. Pine apple ropes are said to bear constant immersion in water, a property which is increased by the natives in some places by tanning the fibre. (*Fibrous Plants of India, pp. 37-41.*)

Ropes. 1050

Mr. Thomas Christy, in his *New Commercial Plants* (*No. 6, page 40*), says that in Rungpore shoemakers largely use the fibre for twine, but that the plant is chiefly cultivated there for its fruit, the fibre being but little appreciated. He also says: "The filaments of pine apple are very fine and flexible and also resistant. They are easily divided after treatment in the alkaline bath, and after being submitted to trituration. The isolated fibres are very fine, of a tolerably regular diameter from one end to the other, but of very different size. The inferior canal, which is very perceptible in the largest, is not so in the smaller ones. They are very flexible, curling and crisping readily under mechanism. The points are rarely sharp, and taper gradually to the extremities. They are rounded, or rather blunt, at the end."

Twine. 1051

MEDICINE. Juice. 1052

Medicine.—In India the fresh juice of the leaves is regarded as a powerful anthelmintic, and that of the fruit as an antiscorbutic. A friend informs me that the natives regard the fresh juice of the fruit as poisonous if hypodermically injected.

Special Opinions.—§"The pure juice of the ripe fruit is said to allay gastric irritability in fever. The fresh juice of the leaves given with sugar is said to relieve hiccup." (*Surgeon-Major Bankabehari Gupta, Púrí.*) "Raw pine apple is used to produce criminal abortion." (*Surgeon-Major Henry David Cook, Calicut, Malabar.*) "It is antiscorbutic, cholagogue. The green fruit is emmenagogue, produces abortion." (*Assistant Surgeon Devendro Nath Roy, Calcutta.*) "The fresh juice of the white portions of the leaves, mixed with sugar, is used as a purgative and anthelmintic. The juice of the ripe fruit is diuretic, diaphoretic, and refrigerant. In large quantities it is believed to have the property of causing strong uterine contractions." (*Brigade Surgeon J. H. Thornton, B.A., M.D., Monghyr.*) "The fruit is antiscorbutic, and the fresh juice of leaves anthelmintic." (*Surgeon C. J. W. Meadows, Burrisal.*) "The juice of the ripe fruit is useful in jaundice." (*Assistant Surgeon K. N. Acharji, Dacca.*) "Used in animal abortion, fruit eaten." (*Surgeon-Major J. J. L. Ratton, Salem.*)

Leaf Juice. 1053

Fruit. 1054

"In the Straits of Malacca the juice of the leaves is used to produce abortion, also as an emmenagogue. The ripe fruit eaten freely has the same effect in a less degree." (*Honorary Surgeon P. Kinsley, Ganjam, Madras.*) "Besides its value as an antiscorbutic, it seems to have an irritant action on the uterus, as it is reported to have caused abortion in weakly or predisposed women." (*Surgeon-Major R. L. Dutt, M.D., Pubna.*) "Its preserve is much employed by the hakims as an excellent nutritive and tonic." (*Surgeon Mokund Lal, Agra.*)

FOOD. Fruit. 1055

Food.—The pine apple is generally regarded as one of the most delicious fruits met with in tropical regions. To avoid the dangerous consequences attributed to it, however, many persons will only eat it when stewed, while others prefer to eat it fresh, with a little sugar or even salt. During the season in Calcutta good pine apples can be purchased for a pice each (*i. e.*, less than a halfpenny.) The pine apples of Burma and of the Straits are, of the Indian forms, those most prized.

§ "On the Malabar coast near Mahé, and in British Burma, near Myanoung, the pine apple is remarkably abundant. In the former tract the natives have a prejudice against eating the fruit, from an idea that it is poisonous, and they consequently destroy it, or give it away. In Myanoung, **Monsieur d'Avera** is trying to make use of the large quantities that grow there to manufacture champagne. I am in correspondence with him on the subject, and he seems hopeful of success. Should the experiment succeed, it could be repeated on the Malabar coast." (*Mr. L. Liotard.*) **Pine apple champagne. 1056**

Chemical Note.—§"The oil or essence of pine apple, used for flavouring purposes in confectionery, is a solution of ethybutyrate in alcohol. This compound has also been employed to give the pine apple flavour to Jamaica rum." (*Surgeon Warden, Prof. of Chemistry, Calcutta.*) **Chemically prepared Pine apple juice. 1057**

Anatherum muricatum, *Retz.*, see **Andropogon muricatus,** *Retz.*

ANCHUSA, *Linn.; Gen. Pl., II., 2, 855.*

Anchusa tinctoria, *Linn.*; BORAGINEÆ. **1058**

Syn. for **Alkanna tinctoria,** *Taush.*

Mr. Baden Powell mentions an oil as obtained from this plant. Other references to the root of this plant occur in works on Indian Economic Science; it is incorrectly described as yielding the *Ratanjote* (see **Onosma echioides,** *Linn.*). **Anchusa** is not indigenous to India, and could only occur in gardens at hill stations.

ANCISTROCLADUS, *Wall.* 1059

Ancistrocladus Vahlii, *Arn.; Fl. Br. Ind., I., 299;* DIPTEROCARPEÆ.

Vern.—*Goná-wel,* SINGH.

Habitat.—Central and Southern parts of Ceylon up to an altitude of 2,000 feet.

Fibre.—**Dr. Trimen** informs me that the long tough stems are used as jungle ropes. **Fibre. 1060**

ANDRACHNE, *Linn.; Gen. Pl., III., 270.* 1061

Andrachne cordifolia, *Müll.-Arg.*; EUPHORBIACEÆ.

Vern.—*Kurkni, gurguli, kurkuli,* PB.; *Kúrkni, gúrgúli,* JHELAM; *Bersu* CHENAB; *Barotri, madare,* RAVI; *Mútkar, chirmútti, pin,* BEAS; *Tsátin* SUTLEJ.

Habitat.—A small shrub, met with in North-West Himálaya, from the Indus to Nepal, ascending to 8,000 feet.

Poison.—"The twigs and leaves are said to kill cattle when browsed in the early morning on an empty stomach." (*Dr. Stewart.*) **POISON. 1062**

Structure of the Wood.—White, moderately hard, close-grained. Weight 45 lbs. per cubic foot. **TIMBER. 1063**

A. trifoliata, *Roxb.; Fl. Ind., Ed. C.B.C., 703.*

Syn. for **Bischoffia javanica,** *Bl.* (*Gamble's Man. Timb., 335*), which see.

ANDROGRAPHIS, *Wall.; Gen. Pl., I., 1099.*

An Indian genus of annual herbaceous or shrubby plants, erect or procumbent, belonging to the Natural Order ACANTHACEÆ, and comprising some 19 species.

a stomachic bitter; and in the "drogue amere." The dose is from ℨss to ℨi in infusion.

Chemical Composition.—The intensely bitter taste appears to be due to an indifferent non-basic principle, since the usual reagents fail to indicate the presence of an alkaloid. Tannic acid produces an abundant precipitate. The infusion is but little altered by salts of iron. It contains a considerable quantity of chloride of sodium. (*Flück. & Hanb., Pharmacog.; Bent. & Trim., 195.*)

§ "The Yanadees, a wandering gipsy tribe in the Madras Presidency, constantly carry a supply of pills made of Creat fresh leaves, and the pulp of the ripe tamarind, which they consider antidotal to the venom of the cobra. A pill made into a paste with water is applied to the bitten part, and some of it is put into the eyes; two pills are given for a dose every hour or two internally." (*Honorary Surgeon P. Kinsley, Chicacole, Ganjam, Madras.*) "Creat leaves with the leaves of Indian birthwort (**Aristolochia indica**) and the fresh inner root-bark of country sarsaparilla, made into an electuary, is used by native hakims as a tonic and alterative in syphilitic cachixia and foul syphilitic ulcers. I have seen many cases successfully treated by this electuary." (*Honorary Surgeon Easton Alfred Morris, Negapatam.*) "The green leaves are given with aniseed (4 to 20) as stomachic and anthelmintic." (*Assistant Surgeon Devendro Nath Roy, Calcutta.*) "This is called Indian Chiretta, and is used as a tonic." (*Surgeon-Major Lionel Beech, Cocanada.*) "Decoction of all parts of the plant acts as a mild antiperiodic." (*Surgeon-Major John Lancaster, M.B., Chittore.*) "It is efficacious in certain forms of skin diseases, especially in eczema." (*Assistant Surgeon J. N. Dey, Jeypore.*) "Febrifuge, used in infusion." (*Surgeon-Major J. J. L. Ratton, Salem.*)

Pills. 1071

ANDROPOGON, *Linn.; Gen. Pl., III., 1133.* 1072

A genus of grasses (GRAMINEÆ) belonging to the tribe ANDROPOGONEÆ, of which about 25 species are met with in India.

Spikes polygamous, arranged in pairs (or many) on a common slender peduncle, at the bent basal node of which occurs a large leafy bract which in bud encloses the pair of spikes; *peduncles* arising from the zig-zag flattened branches of a panicle. *Panicles* pendulous, single or clustered from the axils of the upper leaves. *Spikelets* articulated to the rachis of the spike in pairs, the one sessile and hermaphrodite (or rarely feminine), the other pedicillate, exaristate and masculine, rarely hermaphrodite, sterile, or reduced to empty glumes. Terminal spikelets often in threes, the middle fertile, one lateral male and the other neuter. *Glumes* sub-equal, often longer than the hermaphrodite flowers; the lowest largest; those of the stalked spikes many-veined, often sessile; the lower glume is flattened on the back against the rachis and veinless. *Pales* very small, the lowest deeply bifid, from the sinus of which arises a long awn.

The species of economic interest met with in India belong chiefly to the section which corresponds to the sub-genus CYMBOPOGON, characterised by their large bracts, and by the veination of the glumes. The generic name is derived from ἀνήρ, a stamen, and πώγων, a beard, in allusion to the bearded appearance of the stamen.

The greatest confusion exists in the identification of the plants yielding the essential oils from this genus. In all collections intended for museum specimens, the plants (in flower) should, if possible, accompany the oils, so as to secure accurate identification. In fact, until such collections have been made it will be impossible to remove the unavoidable errors which must creep into all pure compilations of the literature of a subject so difficult as that of the economic uses of the Indian species of **Andropogon**.

1073 **Andropogon aciculatus,** *Roxb., in Fl. Ind., Ed. C.B.C., 88 (given as Linn. Sp. Pl. Ed. Willd., IV., 906).*

Syn. for **Chrysopogon acicularis,** *Retz.; Duthie's List, p. 22* (the *chora-kanta* of Bengal).

1074 **A. ampliflorus,** *Stend.* Met with in the North-West Himálaya.

1075 **A. ariani,** *Edgew.* Met with in the sandy deserts of the Panjáb.

1076 **A. Bladhii,** *Retz.*

Syn.—LEPEOCERIS BLADHII, *Nees.*

Vern.—*Loari,* BENG.; *Donda* or *dhunda, nilon, janewar* (Captain Wingate's Report for 1876 on the grass farms of Allahabad and Cawnpore), N.-W. P.

Habitat.—Described by **Roxburgh** as a native of hedges and roadsides, but chiefly of old pasture grounds. **Duthie** says it is found in the plains of the North-West Provinces and the Panjáb.

FODDER. 1077 **Fodder.**—**Captain Wingate,** in the report quoted above, seems to speak highly of this as a fodder grass. He says: "At Allahabad the indigenous grass is not *dhoob,* but *janewar,* **Andropogon Bladhii,** and *unjan,* **Pennisetum anchroides.** These two grasses may be seen in their perfection in the Alfred Park of this station in the early part of October." **General Sir Herbert Macpherson,** in a report of a silo experiment in the Allahabad fort with this grass, says: "Both *janewar* and *unjan* are first-rate fodder grasses."

1078 **A. brevifolius,** *Sw.*

Syn.—A. EXERTUS, *Stend.;* POLLINIA BREVIFOLIA and VAGINATA, *Spreng.*

Collected at Hazaribagh (altitude 2,000 feet) by **Mr. C. B. Clarke.**

1079 **A. citratus,** *DC.*

THE LEMON GRASS.

Syn.—CYMBOPOGON CITRATUM, *DC.;* A. SCHŒNANTHUS, *Wall.; Plant. Asiat. Rariores, III., t. 280;* A. SCHŒNANTHUS, *Roxb., in Dalz. and Gib., Bomb. Fl., Sup., 99; Rheed. Hort., Mal., 12, t. 72;* A. SCHŒNANTHUS. *Linn., as in Roxb., Fl. Ind., Ed. C.B.C., 92; Voigt, Hort. Sub. Calc., 706;* and *U. C. Dutt, Mat. Med., Hindús, 271.*

Vern.—*Gandha bená,* BENG.; *Gandha trina,* HIND.; *Hirvacha* or *olancha,* MAR.; *Lilichá, lilacha,* GUJ.; *Hasár-ma-sálah,* DUK.; *Vashanup-pulla, kurpura-pulla,* TAM.; *Nimma-gaddi, chippa-gaddi,* TEL.; *Vasanap-pulla, shambhára-pulla,* MALA.; *Púr-hali-hulla,* KAN.; *Cháe-kashmíri,* PERS.; *Bhústrina,* SANS.; *Penquin,* SINGH.

The vernacular names *Gandha-bená,* BENG., and *Malutrinukung, bhústrinung,* SANSKRIT, are by **Roxburgh** given to a plant he describes as **A. Schœnanthus,** *Linn.* This may probably be **A. citratus,** *DC.,* but it seems to agree equally well in certain respects with **A. laniger,** *Desf.*

Habitat.—A large, coarse, glaucous grass, found under cultivation in various islands of the Eastern Archipelago, and in gardens over an extensive tract of country in India and Ceylon; it rarely or never bears flowers. It is also largely cultivated in Ceylon and in Singapore for its odoriferous oil. "I have seen it in flower more than once." (*Dr. Dymock, Bombay.*)

OIL. 1080 **Oil.**—The lemon grass yields lemon-grass oil, verbena oil, or Indian *molissa* oil.

The Lemon Grass. **ANDROPOGON citratus.**

This oil is chiefly employed in Europe in adulterating true verbena oil. It is largely employed to perfume soaps and greases. The annual production of otto of lemon grass in Ceylon is above 1,500 lbs., valued at 1*s.* 4*d.* per ounce. There is a large consumption of this otto in the manufacture of Eau de Cologne. This oil is said to be more costly and less extensively produced than citronella; it is chiefly manufactured in Ceylon and Singapore. More than half the annual exports go to America. In 1875 Ceylon exported 13,515 ounces of this oil. In India it is used in native perfumery.

PERFUMERY. **Verbena oil.** 1081 **Otto of Lemon Grass.** 1082 **Soaps and Greases.** 1083

Food.—The leaves are often resorted to to flavour tea, and the centre of the stems are cooked in curries.

FOOD. **Leaves.** 1084 **Stems.** 1085

Medicine.—In the Indian Pharmacopœia this oil is regarded as officinal. When pure it is of a pale sherry colour, transparent, with an extremely pungent taste, and a peculiar fragrant lemon-like odour. The properties attributed to it are stimulant, carminative, antispasmodic, and diaphoretic; locally applied it is a rubefacient. It is recommended to be administered in flatulent and spasmodic affections of the bowels and in gastric irritability. In cholera it has been spoken highly of as a remedy of great value, allaying and arresting the vomiting, and aiding the process of reaction. **Dr. Waring**, in the appendix to the Indian Pharmacopœia, records a high testimony in its favour both as an external application in rheumatism and in other painful affections, and as a stimulant and diaphoretic internally. He states that amongst the Indo-Britons of South India, it is one of their most highly esteemed remedies in cholera. **Dr. Ross**, in the same notice, reports very favourably of a warm infusion prepared by macerating about four ounces of the leaves in a pint of hot water. This he has used very successfully as a diaphoretic in febrile affections, especially in weakly subjects, or when the fever is of a typhoid type. (*Pharm. Ind., 464.*)

MEDICINE. **Oil.** 1086

It seems probable that in different parts of India the various species of grass oil are used indiscriminately; indeed, considerable doubt in many cases exists as to the correct species to which the facts contained in the writings of Indian authors should be referred. Externally, they are nearly all used in rheumatism, and are administered internally as carminatives in colic, and an infusion of the leaves is a popular diaphoretic stimulant and antiperiodic, very frequently given in simple catarrh. "An infusion of it as a fever drink has great effect in inducing a remission or intermission by bringing on sweat." (*Dalz. and Gibs., Bomb. Fl.*)

§ **Special Opinions.**—"Infusion of the leaves (tea) is largely used as an agreeable sudorific in mild cases of fever, and as a medicinal vapour bath for the same purpose. It is often combined with **Mentha arvensis**, when used with the above object." (*Assistant Surgeon Sakhárám Arjun Rávat, Bombay.*) "Taken internally, in some parts of India, in the form of an infusion like tea or with milk, it is said to be a stimulant and diaphoretic. The vapour of a hot infusion is inhaled by fever patients to produce diaphoresis." (*Surgeon W. Barren, Bhuj, Cutch, Bombay.*) "An infusion of the leaves (known as "Lemon tea") is very refreshing." (*Honorary Surgeon P. Kinsley, Chicacole, Ganjam, Madras.*) "The roots and tender leaves are sometimes given with black pepper in cases of disordered menstruation and in the congestive and neuralgic forms of dysmenorrhœa. The oil is useful in flatulent colic and other spasmodic affections of the bowels, and as an application in chronic rheumatism, &c." (*Brigade Surgeon J. H. Thornton, B.A., M.B., Monghyr.*) "Carminative and tonic to the intestinal mucus membrane, useful in vomiting and diarrhœa, externally it forms a useful liniment." (*Surgeon-Major Henry David Cook, Malabar.*) "Lemon grass oil, applied with prolonged friction, is a pleasant and useful application in lumbago." (*H. DeTatham,*

Infusion. 1087 **Roots and leaves.** 1088 **Liniment.** 1089

M.D., M.R.C.P. Lond., Ahmednagar.) "It is used as a stomachic for children, and also as a diaphoretic. Externally it is used for ringworm." (*Surgeon H. W. Hill, Mánbhúm.*) "The oil is used to conceal the odour of iodoform in the Dispensary of the Royal Infirmary, Edinburgh." (*Dr. Forsyth, Dinajpore.*)

1090 **Andropogon contortus,** *Linn.*

THE SPEAR GRASS.

Vern.—*Sarwála, sariála, sarári,* PB.; *Parba parbi, parva, bandar pnucha, sarwar, musel, lap,* N.-W. P.; *Panri-pullu,* TAM.; *Eddi, eddigaddi,* TEL.

Habitat.—Grows on pasture grounds; a very troublesome weed; reduced to **Heteropogon contortus,** *R. & S.*, which see.

1091 **A. Hookeri,** *Munro.*

Habitat.—A native of the Panjáb (at Pathankote), altitude 1,500 feet. (*C. B. Clarke.*)

1092 **A. Ischæmum,** *Linn.*

Syn.—A. ANGUSTIFOLIUM, *Sibth. & Sm.*

Vern.—*Palwal jarga,* N.-W. P.

Habitat.—"Grows (at Aligarh) on barren wet soil and is eaten by cattle and horses." (*Lang.*) "Excellent for hay; the seeds are nutritious. This is considered (at Muttra) one of the best fodder grasses." (*Crooke; Duthie's List of Grasses, 20.*)

1093 **A. laniger,** *Desf.*

THE JUNCUS ODORATUS and HERBA SCHŒNANTHI of Pharmacists.

Syn.—A. IWARANCUSA, *Roxb.* (*in part*); CYMBOPOGON LANIGER, *Ders.*; A. OLIVIERI, *Boiss.*

Vern.—*Lámjak, búr, kháwi,* or *khávi, khoi, panni, solára, san, ibharankusha, karan kusha, ghat-yári,* HIND. and PB.; *Káránkusa, ibharankusha,* BENG.; *Miriya ban, ganguli, bad, piriya,* N.-W. P.; *Lámajjaka,* SANS.; *Iskhir,* ARAB. and BOMB.

The *Makhzan-ul-Adwiya* describes two forms of the plant called *Iskhir* and gives their synonyms, from which it would appear that under the first form it confuses **A. Schœnanthus** and **A. laniger** as one. The second form is apparently **A. muricatus,** the *khas-khas* of India. Compare with note under the last species.

Habitat.—Native of the Lower Himálayan tract (said to occur in Thibet at an altitude of 11,000 feet), extending through the plains of the North-West Provinces and Panjáb, to Sind. An inhabitant of dry desert tracts.

History.—"It is particularly mentioned by **Arrian** in his account of Alexander's journey through the Panjáb and Sind, and was gathered by the Phœnician followers of the army in Lus, who called it spikenard. It is common about Kurrachee, and is used as a scent by the natives." (*Dals. & Gibs., Bomb. Fl., 302, under* **A. Iwarancusa,** *Roxb.*) "This plant has a wide distribution, extending from North Africa, through Arabia and North India to Thibet; it is the σχοῖνος ἀρωματικὸς of **Dioscorides,** and the Herba Schœnanthi and Juncus odoratus of Latin writers on Materia Medica. It has also been named **Fœnum camelorum** from its use as a forage for camels. The Arabic name *Iskhir* is given

in the best lexicons as derived from the root ذخر, the same root furnishes the derivative *Zákhirah*, a common term in India for stored-up forage, &c." "Western India is supplied from the Persian Gulf ports." (*Dymock, Mat. Med., W. Ind., 691.*) "**Mr. Tolbort** has sent us specimens under the name of *Khávi* gathered by himself, in 1869, between Multan and Kot Sultán, and quite agreeing with the drug of pharmacy." (*Flück. and Hanb., Pharm., 728.*)

Medicine.—Used to purify the blood, and in coughs, chronic rheumatism, and cholera. It is recommended as a valuable aromatic tonic in dyspepsia, especially that of children; it is also used as a stimulant and diaphoretic both by natives and Europeans, in gout, rheumatism, and fever. (*Baden Powell.*) "The grass has an aromatic, pungent taste, which is retained in very old specimens. We are not aware that it is distilled for essential oil." (*Flück. and Hanb., Pharmacog., 728.*) **U. C. Dutt** says of this species: "Its virtues seem to reside in the larger roots marked with annular cicatrices." MEDICINE. 1094

Fodder.—**Roxburgh** says it grows in large tufts, each tuft composed of a number of plants adhering together by their roots. The roots are aromatic. Cattle are said to be very fond of the grass. The plant has been called **Fœnum camelorum** from its use in dry desert tracts as a forage for camels. FODDER. 1095

§ "A jungle grass, does not grow about cultivation. Is grazed when tender, but not when full grown; may be stacked, and is then useful in times of scarcity; will last 10-12 years in stack. When cattle eat much of this grass the milk becomes scented." (*Mr. Coldstream, Commissioner, Hissar.*)

Andropogon miliaceus, *Roxb.* 1096

THE HILL GRASS.

Syn.—A. MILIFORMIS, *Stend.*

Habitat.—An erect grass, from 6 to 10 feet in height, inhabiting the mountains north of Oudh.

Roxburgh writes: "The seeds of this most beautiful stately grass were sent me from Lucknow by the late **Gen. Claude Martin**, under the name of Hill Grass." It blossoms during the latter part of the rains.

A. muricatus, *Retz.* 1097

CUSCUS, KHUS-KHUS, or KOOSA.

Syn.—A. SQUAROSUS, *Linn.*; VETIVERIA ODORATA, *Virey*; ANATHERUM MURICATUM, *Retz.*; RHAPHIS MURICATA, *Nees*; PHALARIS ZIZANOIDES, *Linn.*

Vern.—(The plant) *Khas, bená, panni, senth, ganrar, onei, balah*, or *bala*, HIND.; *Panni*, PB.; *Bálé-ka-ghâns*, DUK. (the root); *Khas-khas, shanadér jhar, válá bálá* (the root), BENG., HIND., and DUK.; *Sirom*, SANTAL; *Tin*, OUDH; *Válo*, GUJ.; *Válá*, MAR.; *Válá, khasakhasa*, BOMB.; *Válá*, CUTCH; *Vetti-vér, vishalvér, ilâmich-chamvér, viranam*, TAM.; *Vatti-véru, avvuru-gaddi-véru, lamaj-jakamu-véru, vidavali-véru, ouru-véru*, TEL.; *Lávanchá*, KAN.; *Vettivér, ramachcham-vér*, MAL.; *Usira, vir-ana*, SANS.; *Usír*, ARAB.; *Khas*, PERS.; *Savandra-múl*, SINGH.; *Miya-mòe*, BURM.

According to **Moodeen Sheriff**, the lowest parts of the culms of this grass, with or without a portion of its roots, are sold under the Arab name *Iskhir* in South India, while in Haidarabad, Calcutta, &c., *Iskhir* is used for **A. Schœnanthus**. The true *Iskhir* of Arabia does not, according to him, exist in India. He seems also to regard the name *khas-khas* as being

doubtfully a true Bengal synonym. It is the name by which the roots are universally known in Bengal, and there seems no possible chance of confusing them with *khas-khas*, the poppy seed. **Dr. Dymock** (*Mat. Med., W. Ind.*) gives *Izkhir* as the Arab and Bombay name for **A. laniger**, which see.

Habitat.—A perennial, tufted grass, very common in every part of the coast (Coromandel, Mysore), and in Bengal and Burma, where it meets with a low, moist, rich soil, especially on the banks of water-courses, &c. (*Roxb.*) It covers large tracts of waste land in Cuttack. It inhabits the plains of the Panjáb and North-West Provinces, and ascends into Kumaon, 1,000 to 2,000 feet in altitude. (*Duthie.*) Cultivated in Rájputana and Chutia Nagpur (Gobindpur). This plant is alluded to on some copper-plate inscriptions discovered near Etawah (dated A. D. 1103 and 1174) as being one of the articles on which the kings of Kanauj levied imports. (*Proc., As. Soc., Beng., Aug. 1873, p. 161.*)

RESIN. 1098 **Resin.**—The roots contain a resin and volatile oil, which is rather difficult to extract. (*Dr. Bidie's Paris Exhibition Catalogue, p. 47.*)

FIBRE. 1099 **Fibre.**—The roots are extensively made into aromatic scented mats, hung over doors, and kept wet to cool the atmosphere during the hot season, and are also in great demand for making fans, ornamental baskets, and other small articles, &c. The grass is suited for the manufacture of paper, and it is estimated that from 60,000 to 70,000 maunds are annually available in the Hissar district of the Panjáb alone. In the *Gazetteer of the Central Provinces* the grass is described as a "nuisance to the cultivators, as it grows on the rich soils, and is very difficult to eradicate." **Mr. Baden Powell** says the fibre is much used as a packing material.

OIL. Perfumery. 1100 **Oil.**—The roots, when distilled with water, yield a fragrant oil, which is used as a perfume, and as such it deserves the extended attention of European perfumers. **Dr. Irvine**, in his *Medical Topography of Ajmere*, mentions the preparation of attar from the roots of this plant, which he says is used in sherbet.

MEDICINE. Roots. 1101 **Medicine.**—An infusion of the roots is given as a febrifuge and a powder in bilious complaints. *Khas-khas* is regarded as stimulant, diaphoretic, stomachic, and refrigerant. The essence (or otto) is used as a tonic. The roots are regarded as a cooling medicine, and are given mixed with other medicines having similar properties. A paste of the pulverised roots in water is also used as a cooling external application in fevers.

The *Pharmacopœia of India* says of this plant: "Antispasmodic, diaphoretic, diuretic, and emmenagogue properties have been assigned to it; but beyond being a gentle, stimulant diaphoretic, it seems to have no just claims to notice as a medicine. An account of the uses to which it has been put in Europe is given by **Pereira** (*Mat. Med., Vol. II., Pt. I., p. 132*). Its uses in native medicine are detailed in the *Taleef Shereef, p. 14, No. 47*. According to the analysis of **Gager**, it contains a resin, a bitter extractive, and a volatile oil. The dose of the powdered root is about twenty grains, or it may be given in infusion (two drachms of the bruised root to ten ounces of boiling water) in doses of an ounce or more. As a medicine, as far as is at present known, it is an article of minor importance." **U. C. Dutt** says: "It is described as cooling, refrigerant, stomachic, and useful in pyrexia, thirst, inflammation, irritability of the stomach, &c. It enters into the composition of several cooling medicines, as, for example, the preparations called *Shadanga pániya*. A weak infusion of the root is sometimes used as a febrifuge drink. Externally it is used in a variety of ways. A paste of the root is rubbed on the skin to remove oppressive heat or burning of the body. The use of this drug appears to have been popular with the ancients." "An aromatic cooling bath is prepared by adding to a tub of water the following substances in

fine powder, namely, root of **Andropogon muricatus, Pavonia odorata** (*bálá*), red sandal-wood, and a fragrant wood called *padma kashtha*." (*Hindú Mat. Med., 271.*)

Chemical Composition.—"*Khas-khas* has been analysed by **Vanquilin**, who has obtained from it, *1st*, a resinous substance of a deep red-brown colour having an acrid taste and an odour like myrrh; *2nd*, a colouring matter soluble in water; *3rd*, a free acid; *4th*, a salt of lime; *5th*, a considerable quantity of oxide of iron; *6th*, a large quantity of woody matter. (*Vanquilin, Annales de Chimie, t. LXXII., p. 302.*)" (*Dymock's Mat. Med., W. Ind., 692.*)

§"The grass with its roots is boiled in water and used as a steam bath in fevers of a continued type, producing speedy and profuse diaphoresis. The otto is given in two minim doses to check the vomiting of cholera." (*Surgeon-Major J. M. Honston, Travandrum.*)

"Used in the form of cigarettes with benzoin, it relieves headache; a cold infusion is refrigerant." (*Surgeon-Major John Lancaster, Chittore.*)

"Infusion of the root is used as a febrifuge." (*Surgeon-Major J. J. L. Ratton, Salem.*)

"Refrigerant." (*Surgeon C. M. Russell, Sarun.*)

Fodder.—The grass when young affords good fodder. After the rains are over it is cut as bedding for horses at Saharanpur. **FODDER. 1102**

§"Principally used for thatching; not grazed upon except in times of excessive drought. Cattle will eat the young leaves after the stems have been burned down." (*Mr. Coldstream, Commissioner, Hissar.*)

Domestic Uses.—*Tin*, a grass in universal use for thatching purposes, the reeds being made into brooms. The roots of it supply the "*khas*" with which our hot-weather tatties are made. It grows on the banks of rivers and marshes, and is generally strictly preserved, as it takes time to spread. Proprietors are averse to its being dug up for the *khas*. (*Oudh Gazetteer, III., 176.*) The fibre is made into fans, ornamental work-boxes, and other small objects. **DOMESTIC. Thatching grass. 1103 Tatties. 1104 Fans. 1105 Boxes. 1106 1107**

Andropogon Nardus, *Linn.*

THE CITRONELLA.

Syn.—A. FLEXUOSUS, *Nees;* A. COLORATUS, *Nees;* A. MARTINI, *Thw.* (*En. Ceylon Plants, 361, not of others*); A. IWARANCUSA, *Roxb.* (*in part*); CYMBOPOGON FLEXUOSUS, *Nees;* C. NARDUS, *Linn.* (*in Pharm. Ind.*).

Vern.—*Ganjni, or ganjni-ká-ghás, pust-burn,* HIND.; *Kamá-khér,* BENG.; *Ganjni,* DUK.; *Usadhan,* MAR.; *Kámákshi-pullu, mándap-pullu, kávattam-pullu, shunnárip-pullu,* TAM.; *Kámákshi-kasuvu, kámanchi-gaddi,* TEL.; *Kámákshi-pulla, chóra-pulla,* MALA.; *Ganda-hanchi-khaddi,* KAN.; *Maana,* SINGH.; *Sing-ou-miá,* BURM.

Habitat.—A grass common in the plains and lower hills of the North-West Provinces and Panjáb; extensively cultivated in Ceylon and Singapore for the production of oil of citronella. Abundant about Travancore. As cultivated in Ceylon it often rises to the height of 6 or 8 feet. It is most readily recognised from all the other species by its rufous colour, short spikes, and narrow leaves.

Oil.—The leaves are distilled with water, and yield over 3 ozs. of essential oil from 1 cwt. The pure oil is thin and colourless, with a strong aromatic odour, and an acrid, citron-like flavour. **OIL. 1108**

The average exportation of citronella from Colombo is about 40,000 lbs., valued at £8,000, valued at about 4*s*. 1*d*. per lb. It is largely used to give the peculiar flavour to what is known as "Honey-soap."

The extract published below, giving a mode of detection of admixture of other oils with citronella, taken from the *Year-Book of Pharmacy for*

1875, will be found useful, since doubtless the same process would be applicable to all the grass oils. It may be remarked, however, that the author is incorrect in attributing citronella to **A. Schœnanthus**, but the adulteration of the Indian *rusa* oil (the oil from **A. Schœnanthus**) is daily becoming more and more serious, and an easy mode of detecting the adulterations is thus very important. This same mistake is made by **Dr. Wright** (*Year-Book of Pharm., 1874, 631*), who gives some interesting chemical information regarding citronella oil, which he appears to regard as obtained from **A. Schœnanthus.**

Chemical Composition.—Dr. Wright informs us that the essential oil of citronella mainly consists of an oxidized substance boiling near 210°, which becomes to a certain extent resinized, losing partially the elements of water, by continued heat. On analysis it gave quantities which would agree with the formula $C_{10}H_{18}O$, a formula corroborated by its behaviour with bromine, zinc, chlorine, &c. **Prof. Gladstone**, who experimented with citronella oil some time previous to **Dr. Wright** (1872), arrived at the conclusion that it owed its peculiar property to an oxidised oil which he called *Citronellol.* This he separated by fractional distillation into two portions, the one boiling at 200-205° C. and the other at 199b 202° C. The composition of each portion as arrived at by **Gladstone** would be represented by the formula $C_{10}H_{16}O$.

The chemistry of Citronella oil would thus seem to require further investigation to remove the slight disparity in these opinions.

1109 "**Estimation of Fixed Oil in adulterated Citronelle** (*Chem. News, XXX., 293*).—The following method yields constant results when managed with care, and when taken in conjunction with the specific gravity of the sample, may give a good approximation as to the quantity and the class of the adulterating oil:—

"(*a.*) Dissolve about one ounce of caustic potash in five ounces of alcohol in a flask; put on a sand bath, and leave to boil.

"(*b.*) Take an eight-ounce beaker, and weigh into it 400 to 500 grains of the citronella; add two volumes of alcohol; boil on a sand bath.

"(*c.*) When (*a*) and (*b*) are both boiling add one volume of the alcoholic solution of potash to the three volumes alcohol and citronella. Boil for a minute or so, and then fill to within an inch of the top with distilled water. Stir gently, and let boil for half an hour, or until the upper layer is perfectly clear, and the under-fluid semi-transparent. Then allow to cool.

"(*d.*) When quite cold, siphon off the under-fluid [containing water, alcohol, potash, and *soap*, if any fixed oil was in the sample] very carefully into another beaker, and boil gently. Acidify with dilute H_2SO_4. Add 50 or 100 grains of wax, continue gently boiling till the oily layer is perfectly clear, and then allow to cool gradually.

"(*e.*) When cold remove the cake of fat, dry and weigh. The weight, less 50 or 100 grains of wax, is the amount of fatty acid contained in the fixed oil. A simple calculation will show the amount per cent. of the adulterant in the citronella." (*Year-Book of Pharmacy, 1875, p. 302.*)

1110 **Cultivation of the grass and distillation of Citronella Oil.**—In Ceylon the citronella grass is raised from seed and planted like guinea grass, and will give two or three crops a year. When fit to cut, the grass is carried to a large boiler and the oil is distilled. It is estimated to give about three dozen bottles of oil to the acre, but the demand is limited, and price fluctuates from 2*s.* 6*d.* to 4*s.* 6*d.* a bottle. At the latter price it pays handsomely, while at the former it little more than covers expenditure. A still, capable of turning out a dozen bottles a day, costs £300. (*Report by Major Wimberley, Officiating Deputy Superintenden, Port Blair, from the Tropical Agriculturist, Vol. III., p. 58.*)

Citronella Grass-stuff as a Paper Fibre.—A correspondent, writing in the *Ceylon Observer*, suggested the use of citronella grass as paper material. In extracting oil from the grass, it is boiled or subjected to steam, under pressure, and as this is one of the first operations to which the raw material is subjected in paper manufacture, grass which has been thus treated should be much more easily utilised than material not previously boiled. Citronella grass, like esparto, can be supplied entirely free from knots, which is a great advantage in paper manufacture. At present about 3,500 tons of citronella are available for export in Ceylon. (*Tropical Agriculturist, Vol. III., p. 831.*) FIBRE. 1111

Medicine.—This is regarded as officinal by the Indian Pharmacopœia; the essential oil of citronella used medicinally being imported from Ceylon. In its properties it closely approaches that from **A. citratus.** MEDICINE. Oil. 1112

Dr. Irvine, in his *Materia Medica of Patna,* says that the infusion of the leaves in doses of ½ to 2 ounces is used as a stomachic. Infusion. 1113

Domestic Uses.—Dr. Trimen writes me that this grass is in Ceylon largely used for thatching.

Andropogon pertusus, *Willd.* 1114

Syn.—A. PUNCTALUS, *Roxb.*; HOLEUS PERTUSUS, *Linn.*; A. ANNULATUS, *Forsk.*; LEPEOCERCIS PERTUSUS, *Hassk.*

Vern.—*Pulwal, pulúah, rukar,* N.-W. P.; *Palwán,* or *palwa minyár,* PB.

Habitat.—Found on old pasture grounds, generally shaded by trees, in the plains of the Panjáb and North-West Provinces, and at lower elevations of the Himálaya. Abundant in Hissar.

Fodder.—Dr. Stewart, writing under **A. annulatus,** *Forsk.*, says: "It is considered excellent fodder for bullocks, &c., and for horses, when green." In Australia it is regarded as one of the best grasses to withstand long droughts, while it will bear any amount of feeding. (*Baron Von Mueller.*) FODDER. 1115

§ "Good for stacking, will remain for 12 or 13 years: much stacked at the Hissar farm. Is especially grazed by buffaloes." (*Mr. Coldstream, Commissioner, Hissar.*)

A. scandens, *Roxb.*

Habitat.—Found in the Panjáb, in Kashmír, and Bundelkhand. It is a coarse grass growing commonly in hedges. It flowers during the rains.

Fodder.—Cattle are apparently not fond of it. FODDER. 1116

A. Schœnanthus, *Linn.; Royle, Ill. Him., t. 97.* 1117

THE GERANIUM GRASS; RUSA OIL GRASS; OIL OF GINGER GRASS.

Syn.—A. MARTINI, *Roxb.*; A. NAEDOIDES, *Nees*; A. CALAMUS AROMATICUS, *Royle*; A. PACHNODES, *Trin.*; CYMBOPOGON MARTINI, *Munro.*

Vern.—*Rúsá ghás, rousá-ghás, rousá-kú-ghás, musel, mirchia gand,* HIND.; *Agyá-ghás, gandha bena,* BENG.; *Bujina, pálá-khari,* N.-W. P.; *Raúns,* PB.; *Mirchia-gard,* SIWALIKS; *Rosegavat, rohisha,* BOMB., MAR.; *Rusa-ka-tel, roshel* (the oil).

In **Moodeen Sheriff's** Supplement to the Pharmacopœia of India the vernacular names for the Lemon grass are given under **A. Schœnanthus** instead of **A. citratus.**

Habitat.—This grass is wild in Central India, the North-West Provinces, and the Panjáb. **Dr. Roxburgh** first saw the plant from seeds, forwarded to him by **General Martin,** collected in Balaghat during the last war with Tippu Sultan. This is the roussa paper grass, abundant everywhere in the Deccan.

OIL. 1118 **Oil.**—The oil obtained from this plant has come to bear a number of names, which appear for the most part to be of modern origin, and to indicate the use to which it is put. Perhaps the name by which it is most generally known is rusa oil, *roshel* (*rusa-ka-tel*). As pointed out by the distinguished authors of the *Pharmacographia*, these names look exceedingly like a corruption from rose oil, the more so since the principal consumption is as an adulterant for attar of roses. It is curious, however, that, as stated by **Dr. Dymock** (*Mat. Med., W. Ind., 690*), the Indian distillers and dealers know nothing of this use. About 40,000 lbs. are annually exported from Bombay to the Red Sea ports, chiefly to Jedda; a small amount finds its way to Europe, but the great bulk is sent to European Turkey. In Arabia and Turkey it appears under the name of *idris yaghi*, and in the attar-producing districts of the Balkan, it is known, at least to Europeans, as geranium oil or Palmarosa oil. The name Geranium oil, which has caused much confusion with the true geranium oil or oil from the geranium plant, has apparently come into existence from the fact that the so-called geranium grass oil is used to adulterate the true geranium oil, which in its turn is used as an adulterant for attar of roses. **Piesse** says that true geranium oil is worth 3*s*. an ounce, whereas geranium grass oil is not worth more than that sum per lb.

The *Pharmacographia* gives some interesting information regarding the mode by which *rusha* oil is refined so as to prepare it for admixture with the attar of roses. The *rusha* oil is shaken with water, acidulated with lemon-juice, and then exposed to the sun and air. By this process it loses its penetrating after-smell and acquires a pale-straw colour. "The optical and chemical differences between grass oil thus refined and attar of roses are slight, and do not indicate a small admixture of the former. If grass oil is added largely to attar, it will prevent its congealing" (*p. 728*). "It was formerly added to the attar only in Constantinople, but now the mixing takes place at the seat of the manufacture. It is said that in many places the roses are sprinkled with it before being placed in the still. As grass oil does not solidify by cold, its admixture with rose oil renders the latter less disposed to crystallize" (*p. 267*). The degree of admixture with grass oil is thus determined by the crystallizing of the attar.

From the fact of one of the largest supplies of Indian grass or *rusha* oil being in Nimar district, Khándesh, Bombay Presidency, the oil has come to bear the commercial name of Nimar (or, as it is commercially written, Namar) oil. **Dr. Dymock** gives some interesting information regarding this industry. The first mention apparently of the oil is by **Maxwell** in 1825 (*in the Calcutta Med. Phys. Trans., Vol. I., p. 367*). It was afterwards described by **Forsyth**, 1827 (*Ibid., Vol. III., p. 213*). It is only within comparatively recent times that the oil has become an article of commercial value. **Dr. Dymock** thus describes its manufacture: "It is now chiefly distilled in the Nimar district, an iron still being used and a very small quantity of water; when the still is carelessly worked, the grass burns and communicates a dark colour to the oil, which should be of a pale sherry colour. I am assured by the Bombay dealers that all the oil of commerce is more or less adulterated; a comparison of the commercial article with some oil distilled by myself supports this statement; the adulteration is said to be practised by the distillers, who, I am informed, are regularly supplied with oil of turpentine from Bombay. The grass flowers in October and November, and is then fit for cutting: 373 lbs. of grass received from Khándesh, and submitted to distillation under my own superintendence in Bombay, yielded 1 lb. 5¼ ozs. of oil." It appears that the chief substances used to adulterate the Khándesh *rusha* oil are turpentine, ground nut, rape and

linseed oils. With the two first the turbidity passes off in a day or two, hence they are preferred, and turpentine is chiefly used, because it cannot be detected by the evaporation test. **Dr. Dymock** adds: "The genuine oil is dextrogyre; the ray is rotated 39° to the right by 100 min.: 200 min. rotate it 78°. Some samples of the commercial article rotate the ray about 13° to the right; some have little or no effect upon it."

Medicine.—The oil is used as a liniment in chronic rheumatism and neuralgia, and is believed to have the property of curing baldness. It resembles, in quality and appearance, the lemon-grass oil. The oil is seldom taken internally by the natives, but is considered a powerful stimulant when applied externally. MEDICINE. Oil. 1119

Ainslie calls **A. Nardus** (?) ginger grass or spice grass, and says that an infusion of it is used as a stomachic, and that occasionally an essential oil is prepared from it which is useful in rheumatism; but the plant he refers to is probably **A. Schœnanthus.** Similar confusion exists in the writings of most Indian authors. § "There is a grass about Bombay which smells like fresh ginger. I think it must have been introduced, as it is only found about fields and gardens." (*Surgeon-Major W. Dymock.*) It seems probable this is **Ainslie's** plant, which may prove a distinct species from **A. Schœnanthus.**

The *Bombay Gazetteer* gives an interesting account of the manner in which *rusa* oil used to be prepared at the Panch Mahâls. Paper, soap, and grass-oil were formerly prepared, but these industries have almost entirely disappeared: "The grass-oil made from the large-bladed aromatic grass known as *roisa,* which used to grow over large stretches of waste land, was, at the rate of 4*s.* (R2) a pound, bought in considerable quantities, and used partly as a remedy for rheumatism, partly to mix with attar of roses. The oil was extracted by distillation. A rough stone oven was built by the side of a stream, and in it a large metal caldron was placed and filled with bundles of grass and water. When full, a wooden lid was put on, and sealed with a plaster of ground pulse, *adad.* Through a hole in the lid one end of a hollow bamboo was thrust and the other end passed into a smaller metal vessel securely fixed under water in the bed of the stream. The oven was then heated, and the vapour passing through the hollow bamboo was, by the coldness of the smaller vessel, precipitated as oil." (*Bombay Gazetteer, III., 251.*)

Mr. Baden Powell appears to be referring to this plant, under **Cymbopogon aromaticus** (**Vern.**—*Khas, usar, balam*). He says: "Considered by natives cool and astringent, useful in skin diseases, bilious affections, and special diseases. It is an aromatic stimulant, useful in fever, and to make *tatties.* The roots are dug up in March and April. Used as an aromatic in fever. Gives a fragrant oil." (*Panjáb Products, Vol. I., 383.*) This quotation might, as far as its facts are concerned, be equally applicable to **A. muricatus**; but since in another part of his work **Mr. Baden Powell** alludes to the *khas-khas* under its correct botanical synonym, and the more so since **A. Schœnanthus** is a native of the Panjáb, it seems a just inference that by **Cymbopogon aromaticus** is meant **A. Schœnanthus.** If this be correct, the above vernacular names become of interest as those in use in the Panjáb for this species. **Dr. Stewart** describes two species as common in the plains of the Panjáb, but he gives their characters and vernacular names jointly, and it is therefore impossible to separate them. The scientific names which he gives to these Panjáb forms are equally confusing—**Cymbopogon Iwarancusa,** *Schult.,* and **C. laniger,** *Desf.* Regarding the latter there seems little or no doubt it is **Andropogon laniger,** *Desf.,* the species which inhabits the dry, sandy, and desert tracts of the Panjáb, Sind, &c. The former seems to be **A. Schœnanthus,** *Linn.,* which by **Stewart** has been

incorrectly named **Cymbopogon Iwarancusa,** *Schult.* The oil which **Stewart,** on the authority of **Vigne,** says is prepared near Hassan Abdál would, according to this view, be a form of rusa or Nimar grass oil. **Stewart** adds the exceedingly interesting fact, which does not appear to have been observed by other authors: "A spirit" (*arak*), he says, is "also distilled from the grass with spices, &c., and is said to be useful in indigestion and fever." **Madden** mentions that the roots are sometimes luminous.

§ "The decoction of it is a febrifuge, and I have used it in cases of cold and feverishness with benefit." (*Assistant Surgeon Bolly Chand Sen, Calcutta.*) "Excellent external application in rheumatism." (*Assistant Surgeon Nehal Singh, Saharunpore.*) "Mixed with tea in equal proportion and infused, is sometimes used as a diaphoretic in fevers." (*Surgeon-Major C. J. McKenna, Cawnpore.*)

FODDER. 1120 **Fodder.—Duthie** writes: "The grass is a favourite fodder for cattle, and **Mr. Miller** tells me that at Banda (North-West Provinces) it is grown in meadows kept for the purpose and sold in the bazar."

General Martin collected seed of this grass in the high-lands of Balaghat, while there with the army during the war with Tippu Sultan; and after growing it in Lucknow sent specimens to **Dr. Roxburgh,** with the remark that he had noticed the cattle were voraciously fond of it, but that it had so strong an aromatic and pungent taste that the flesh of the animals fed upon it, as also the milk and butter, were strongly scented with the plant. There seems some mistake in this account of General Martin having collected **A. Schœnanthus** on high-lands: it frequents swamps. **A. laniger,** *Desf.*, is found on dry places.

§ "Not very good for grazing. Grows in swamps, but not abundant in Hissar. A tall grass, too coarse to stack but used for thatching and screens." (*Mr. Coldstream, Commissioner, Hissar.*)

1121 **ANEILEMA,** *R. Br.; C. B. Clarke, in DC. Monogr. Phaner., III., 195; Gen. Pl., III., 849.*

A genus of herbaceous perennials, belonging to the Natural Order COMMELINACEÆ, and the Tribe COMMELINEÆ, comprising 60 species, chiefly Asiatic and African, only 5 or 6 occurring in America. In India there are 28 species met with in the plains, one or two ascending to 2,500 feet in altitude.

Stem erect, delicate rarely robust, simple or branched. *Leaves* scattered or crowded and radical. *Peduncles* often terminal or in the axils of the upper leaves, simple or branched. *Inflorescence* a many-flowered panicle with the middle branches the longest, or corymbose, or few-flowered, rarely 1-flowered; *bracts* few, rarely herbaceous and sheathing; in a few species they resemble the spathaceous condition of Commelina. *Stamens* 6, of which 3-2 are fertile, free filaments, tapering, hairy or glabrous; of these 2 are opposite the lateral and interior sepals and have large anthers, the cells of which are parallel and united throughout their length; 1 opposite the anterior petal generally fertile, but with the anthers diverging; the other 3 stamens have sterile anthers. *Ovary* sessile, 3-locular. *Seeds* few or solitary, arranged in 1 or 2 vertical series.

1122 **Aneilema scapiflorum,** *Wight, Ic., t. 2073.*

Syn.—COMMELINA SCAPIFLORA, *Roxb., Fl. Ind., Ed. C.B.C., 59;* A. TUBEROSUM, *Buch., Ham. in Wall., Cat.;* MURDANNIA TUBEROSA, *Royle, Him. Ill., t. 95.*

Vern.—*Kureli,* BENG.; *Siyah músli,* or *músli-e-siyah,* PERS., HIND.; *Sismulið,* GUJ.

The above (Hindustani) vernacular names are by authors said to be applied to the tubers of this plant, but it would seem that this can only be the case when used as substitutes for the true *Siyah músli*—the roots

of **Curculigo orchioides**, *Gærtn.;* it is difficult to discover whether it possesses any properties of its own or not.

References.—*DeCandolle, Monog. Phaner., by C. B. Clarke, III., 200; Clarke's Commel et Cyrt., Beng., t. 14 ; Stewart's Pb. Pl., 236.*

Habitat.—A native of the Himálaya from the Jumna to the Khásia Hills; Tenasserim, and south to Cape Comorin, ascending to 1,000 feet in altitude.

Botanic Diagnosis.—Roots perennial fascicled, tuberous-fusiform. *Scape* composed of dichotomous elongated pikes, branches angled; bracts large, sheathing or spathaceous, often ochreate. *Petals* equal, rounded, concave, blue. *Stamens* 3 perfect, with 3 sterile alternating ones; filaments all hairy; anthers blue. *Capsule* 3-angled ellipsoid, apex acute or mucronate. *Seeds* white, minutely reticulated and very minutely glandular.

Properties and Uses—

Medicine.—Said to have astringent and tonic properties, and considered by natives to be hot and dry; useful in headache, giddiness, fever, jaundice, and deafness. It is also regarded as an antidote to poisons, and a cure for snake-bite. **MEDICINE. Tuberous Root. 1123**

§ "The roots of this plant bear no resemblance to the *Siyah Músli* of the bazars." (*Surgeon-Major Dymock, Bombay.*) "The dried powder, mixed with sugar, is used as an aphrodisiac. With the juice of the *túlsí* leaves it is administered for pains in the kidneys, and is one of the chief remedies used by hakims for spermatorrhea." (*Surgeon Emerson, Calcutta.*) "Root-bark dried in the shade is said to have been employed with benefit in cases of asthma. It is a remedy of great repute for impotence and spermatorrhœa. It is used also in colic, piles, and infantile convulsions. In combination with *Dárfilfil* it is employed in bites of mad dogs, both internally and externally." (*Asst. Surgeon Gholam Nabi.*) "It is used for incontinence of urine." (*Surgeon-Major C. W. Calthrop, Morar.*)

ANEMONE, *Linn.; Gen. Pl., I., 4.* 1124

A genus of perennial herbs, belonging to the Natural Order RANUNCULACEÆ. *Leaves* radical, lobed or divided. *Flowers* occurring in 1 or more flowered simple or branched scapes; involucre 3-partite, bracts free or connate. *Petals* O. *Stamens* many, outer deformed or petaloid. *Carpels* many; *ovule* 1, pendulous. *Fruit* a head of sessile achenes, with naked or bearded styles.

There are some 80 species, natives of the cold and temperate regions, of which 15 occur in India.

Anemone obtusiloba, *Don; Fl. Br. Ind., I., 8.* 1125

Vern.—*Rattanjog, padar,* PB.

Habitat.—Temperate and Alpine Himálaya, from Kashmír to Sikkim; altitude 9,000 to 15,000 feet.

Chemical Composition.—Several varieties of Anemone contain a principle, *anemone* or *anemone camphor,* which is stated to be an acrid poison. *Anemonic acid* is also contained in the fresh herbs.

Medicine.—In Hazára the pounded root, which is acrid, is mixed with milk and given internally for contusions. In Bissahir it is said to be used as a blister, but to be apt to produce sores and scars. (*J. L. Stewart, Pb. Pl.*) **MEDICINE. Root. 1126**

§ "The seeds (which are as sweet as almonds), if given internally, produce vomiting and purging. The oil extracted from them is used in rheumatism." (*Bappoojee Joyaram Bhoslay, Junagarh.*)

Anethum Sowa, *Kurz*, and A. graveolens, *Linn.*

See **Peucedanum graveolens**, *Benth.;* UMBELLIFERÆ.

1127 ## ANGELICA, *Linn.; Gen. Pl., I., 916.*

Angelica glauca, *Edgw.; Fl. Br. Ind., II., 706;* UMBELLIFERÆ.

Vern.—*Chora* or *Churá*, PB.

Habitat.—From Kashmír to Simla, altitude 8,000 to 10,000 feet; found also in the Dhanla Dhar Range, above the Kangra Valley.

MEDICINE. 1128 **Medicine.**—A cordial and stimulant remedy, formerly used in the cure of flatulence and dyspepsia. It is also used in obstinate constipation, and in bilious complaints.

FOOD. 1129 **Food.**—Its aromatic root is added to food to give it a flavour like that of celery.

Angustura Bark, see **Galipea Cusparia,** *St. Hil.;* RUTACEÆ.

Anise-seed, see **Pimpinella Anisum,** *Linn.;* UMBELLIFERÆ.

Anise, Star, see **Illicium Anisatum,** *Linn.;* MAGNOLIACEÆ.

1130 ## ANISOCHILUS, *Wall.; Gen. Pl., II., 1177.*

Anisochilus carnosus, *Wall.; DC. Prod., XII., 81;* LABIATÆ.

Vern.—*Panjiri-ká-pát, sitá-ki-panjiri,* HIND.; *Kápurli, chora-onva, kapúrli,* BOMB., MAR.; *Ajmánu-pátru, ajamá,* GUJ.; *Ajván-ka-patta, panjiri-ká-pattá,* DUK.; *Karppúra-valli,* TAM.; *Karpúra-valli, ómamu-áku, róga-chettu,* TEL.; *Chómara, kattu-kúrkká, kúrkká, patu-kúrkká,* MAL.; *Dodda-patri,* KAN.

Habitat.—Found in the North Circars and Malabar.

MEDICINE. Leaves. 1131 **Medicine.**—Ainslie says that the fresh juice of the leaves mixed with sugar-candy is given by the Tamil doctors in cynanche, and, mixed with sugar and gingelly oil, is used as a cooling liniment for the head. The leaves and stems are given in infusion in coughs and colds as a mild expectorant, especially for children. The plant yields a volatile oil which is said to be stimulant, diaphoretic, and expectorant. (*Dymock; Pharm. Ind.; Bidie, Madras Quart. Med. Journ., 1862.*)

§ "The juice of the leaves mixed with sugar and human milk is in Mysore a popular domestic remedy for coughs in children." (*Surgeon-Major North, Bangalore.*)

"Juice used in catarrh." (*Surgeon-Major J. J. L. Ratton, M.D., Salem.*)

Anisodus luridans, *Linth. & Otto.,* see **Scopolia lurida,** *Dunal.;* SOLANACEÆ.

1132 ## ANISOMELES, *R. Br.; Gen. Pl., II., 1207.*

Anisomeles malabarica, *R. Br.; DC. Prod., XII., 456; Wight, Ic., t. 864;* LABIATÆ.

Vern.—*Chodhará,* MAR., BOMB.; *Mogbire-ka-pattá,* DUK.; *Peymarutti, péya-verutti, irattai-péy, marutti,* TAM.; *Moga-biráká, moga-bira, maga-bira, mogbira, mabheri-china-ranabheri,* TEL.; *Péyi-meratti, peruntumba, karintúmba,* MAL.; *Bútan-kúshum,* SANS.

§ "This plant, in Bombay, is known as *Chodhara* (four-angled). It is aromatic, but is not the *Gule-gao-zubán*, which is mucilaginous." (*Sakhárám Arjun Rávat, Bombay.*)

Dr. Birdwood mentions this as one of the plants which in Bombay

are sold as *gao-subán*, but this seems to be a mistake. I have, however, received that as the name by which it is known in Cutch; the true *gao-subán* is imported into India from Persia,—see **Echium**; but doubtless many other plants are sold under that name.

Habitat.—Found in South India. Dr. Dymock says it is pretty common on the Ghâts in the Bombay Presidency, but appears to be better known in South India.

Medicine.—"Few plants are held in higher esteem, or are more frequently employed in native practice than this. An infusion of the aromatic bitter leaves is in common use in affections of the stomach and bowels, catarrhal affections, and intermittent fevers. According to Dr. Wight, in addition to its internal use in the cure of fevers, patients are made to inhale the vapour of a hot infusion so as to induce copious diaphoresis." (*Pharm. Ind.*) Ainslie tells us that an infusion of the leaves is given to children in colic, dyspepsia, and fever arising from teething. A decoction of the plant, or the essential oil distilled from the leaves, is used externally in rheumatism. (*Dymock.*) MEDICINE. Leaves. 1133 Infusion. 1134 Decoction. 1135

§ "A handful of the leaves is used in Mysore with a vapour bath when profuse diaphoresis is required." (*Surgeon-Major John North, Bangalore.*) "Diaphoretic, dose of infusion 1 to 2 oz." (*Surgeon W. Barren, Bhuj, Cutch.*)

Anisomeles ovata, *R. Br.* 1136

Vern.—*Gobura.*

Habitat.—Found in Ceylon, Coromandel, Bombay, Bengal, and Nepal.

Medicine.—The whole plant has a strong camphoraceous smell. In Ceylon a distilled oil is prepared from it, and found useful in uterine affections. It has also carminative, astringent, and tonic properties. MEDICINE. 1137

ANISOPHYLLEA, *Brown; Gen. Pl., I., 683.* 1138

A genus of trees or shrubs, belonging to the Natural Order RHIZOPHOREÆ.

Leaves alternate, ex-stipulate. *Flowers* minute, in axillary simpled or fascicled spikes, ebracteate or minutely bracteolate, bi- or uni-sexual. *Petals* 4, small, involute. *Stamens* 8; *filaments* short, subulate; *anthers* small, didyamous. *Ovary* inferior 4-celled; *styles* 4. *Embryo* exalbuminous.

Anisophyllea zeylanica, *Benth.; Fl. Br. Ind., II., 442.* 1139

Vern.—*Wellipyanne,* SINGH.

Habitat.—A tree of the southern and central parts of Ceylon, ascending to 1,500 feet.

Structure of the Wood.—Greyish brown, moderately hard. TIMBER. 1140

ANODENDRON, *A.DC.; Gen. Pl., II., 719.* 1141

Anodendron paniculatum, *A.DC.; Fl. Br. Ind.,* III., *668;* APOCYNACEÆ.

Vern.—*Dúl,* SINGH.

Habitat.—An immense climber, occurring from Sylhet to Martaban; the Deccan Peninsula; Western Ghâts from the Konkan southward; Ceylon; altitude from the plains up to 2,000 feet.

Fibre.—The stem yields a fine and very strong fibre, much used by the Singhalese (*Thwaites; Trimen.*) FIBRE. 1142